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RECIPES FROM CANNED GALONGONG (*DECAPTERUS* SP.), SALMON STYLE*

By

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ABSTRACT

Various recipes utilizing canned galongong (*Decapterus* sp.) Salmon style, were prepared and tested by a taste panel according to appearance, flavor and texture. Efforts were made to reduce the cost accounting of all the recipes without sacrificing the flavor, appearance and texture. Ingredients used were either obtained locally or imported. Twenty recipes were approved by the taste panel.

Introduction

The Fisheries Statistics of the Philippines (1958) revealed that galongong (*Decapterus* sp.) is available the whole year round in the markets of Manila and suburbs. It is cheaper than most of the fishes sold owing to its relative abundance.

Galongong is high in food value. Among the local market fishes analyzed by Sulit, *et al* (1953) galongong is one among the ten leading fishes having the highest number of calories per gram of edible portion. The percentage of protein (21.90%) is relatively higher than bangos (*Chanos chanos*) and other common species. Its proximate chemical composition and calorific food value reveal the following:

Edible portion	—	71.24%
Non-edible portion	—	28.76%
Moisture	—	74.19%
Ash (minerals)	—	1.81%
Protein (N $\times$ 6.25)	—	21.90%
Fat (Ether extractives)	—	0.95%
Carbohydrate by difference	—	1.15%

Calories per 100 grams of edible portion, 101.

Since galongong is highly perishable, it could hardly reach the rural areas in the fresh state, and if ever, the price is already high because of additional handling expenses. What is needed is a acceptably cheap and continuous supply of galongong in its preserved form that can be prepared into various recipes. With the advent of home canning, people in the rural areas, especially those from the coastal towns where there are excesses in the supply of raw material, can pack galongong in the cheapest methods of fish preparation. There is satisfaction in having well-stocked shelves of canned galongong, salmon style, from which a well-rounded and attractive menu can be prepared when fresh fish is not available.

To pack galongong (salmon style), fill the can with cleaned flesh portion allowing 3.2 to 12.7 mm. ($\frac{1}{8}$ to $\frac{1}{2}$ in.) for headspace, add salt, exhaust, seal completely then process. Ordinarily, to a 198 g. (7 -oz.) can, eight to nine pieces

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of regular-sized galongong are filled and 1 teaspoon of salt added and processed for 75 minutes at 0.7 kg./cm² (10 lb./sq. in.) pressure. When packing in jars the same procedure is followed without exhausting. Instead, the jars are half-sealed and the final sealing done immediately after processing.

Experimental

The various recipes utilizing canned galongong, salmon style, have been experimented at the Dagat-dagatan Technological Research Laboratory. Repeat experiments have been for each recipe tested. A taste panel has been formed from the technical personnel of the Dagat-dagatan Research Station and standard procedures of testing were followed to evaluate the flavor and appearance and texture of each food item.

Guinataang Galongong

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|----------------------------------|--|
| 1 can galongong | 2 teaspoon salt |
| 1 cup coconut milk (1st extract) | $\frac{1}{4}$ cup "malunggay" leaves (horseradish) |
| 1 cup coconut milk (2nd extract) | 5 pieces "Siling labuyo" (native pepper) |

Boil the galongong in the second extract of coconut milk. Add "sili" and salt. When cooked, add the first extract and the "malunggay" leaves. Serves 6.

Paksiw Na Galongong Sa Gata

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|--------------------------------------|---------------------|
| 1 can galongong | 12 tablespoon water |
| 1 piece tahure (salted soybean curd) | |
| 1 small piece ginger | 2 small tomatoes |
| 1 medium onion | 3 segments garlic |
| 2 $\frac{1}{2}$ teaspoon vinegar | lard |

Fry the fish. Cut the onion and tomatoes into small pieces. Crush the garlic, cut the ginger into strips. Saute the garlic, onion, tomatoes and ginger. Melt the "tahure" in water and then add to the sauted mixture. Add the vinegar and let it boil. Then add the fried fish. Serves 6.

Piniritong Lumpiang Galongong

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|-------------------|----------------------------------|
| 1 can galongong | 6 tomatoes |
| 2 segments garlic | "Lumpia" (starch sheets) wrapper |
| 2 onions | lard |
| 1 piece pickle | 5 teaspoon soy sauce |

Crush the garlic, chop the onions, tomatoes and pickle. Flake the fish. Saute the garlic, onion, tomatoes and pickle. Then add the fish. Season with toyo. Let it cook. Remove from fire and cool. Wrap with lumpia wrapper and fry in deep fat. Serve with sweet sour sauce. Serves 6.

Galongong Sarciado

- | | |
|----------------------------|--------------------|
| 1 can galongong | Lard |
| $\frac{1}{2}$ cup tomatoes | 1 teaspoon salt |
| $\frac{1}{2}$ cup onion | 1 teaspoon sugar |
| | 3 tablespoon water |

Fry the fish. Chop tomatoes and onion, crush the garlic. Saute the garlic, onion and tomatoes. Add water, season with sugar and salt. Let it boil for five minutes. Then add the fish. Serves 4.

Macaroni-Galongong Salad

- | | |
|---|--------------------------------|
| 2 cups cooked and cooled macaroni | 3 tablespoon pimiento, chopped |
| 1 can galongong flaked | $\frac{3}{4}$ cup Mayonnaise |
| 1 cup diced cucumber | $\frac{3}{4}$ teaspoon salt |
| 2 $\frac{1}{2}$ tablespoon grated onion | $\frac{3}{4}$ teaspoon pepper |
| 3 tablespoon pickles, chopped | |

Combine all the ingredients toss together until blended. Serve hot or cold. Serves 4.

Galongong With French Dressing

- | | |
|------------------------|---------------|
| 1 can flaked galongong | 2 tablespoon |
| | pimiento |
| 2 tablespoon cold | 3 tablespoon |
| boiled potatoes | chopped crisp |
| | pickles |
| 2 tablespoon French | Mayonnaise |
| dressing | |

Marinate potatoes by tossing with French dressing. Chill potatoes and galongong thoroughly. Mix together lightly with pickles and mayonnaise. Put in a platter. Sprinkle with paprika and finely minced parsley. Surround with lettuce cups, each containing wedges of tomatoes and shiny black olives for 1 serving. Serves 4.

Galongong Salad Tropical

- | | |
|--------------------------------|----------------------|
| 1 can flaked | 2 tablespoon chopped |
| galongong | sweet pickles |
| 3 bananas, diced | 4 tablespoon mayon- |
| | naise |
| 1 small can | 1 teaspoon salt |
| pineapple, diced | |
| $\frac{1}{2}$ cup dried celery | 3 tablespoon chopped |
| | pimiento |

Mix together all the ingredients. Arrange on lettuce. Garnish. Makes 4 servings.

Galongong Sandwich

- | | |
|-----------------------------|-------------------------------|
| 1 can flaked | $\frac{1}{2}$ teaspoon pepper |
| galongong | |
| 5 tablespoon celery | cucumber slices |
| 4 tablespoon | tomato slices |
| mayonnaise | |
| 1 loaf of bread | 3 tablespoon chopped |
| | pimiento |
| $\frac{1}{4}$ teaspoon salt | |

Mix together flaked galongong, chopped celery, salt and pepper and enough mayonnaise. Spread the mixture on sliced bread, cover with tomato and cucumber slices and little mayonnaise, top with other slices. Serves 8.

Galongong Roll-up

- | | |
|-------------------------------|-------------------|
| 2 cans galongong | 1 teaspoon grated |
| | lemon rind |
| $\frac{1}{2}$ teaspoon salt | 2 cups packaged |
| | biscuit |
| $\frac{1}{8}$ teaspoon pepper | 1 tablespoon |
| | lemon juice |
| 1 pimiento, chopped | 1 egg yolk |
| 3 sprigs parsley, | 2 tablespoon milk |
| (chopped) | |

Flake galongong. Add seasonings, pimiento and parsley and mix using fork.

Add lemon rind to biscuit and mix. Stir in lemon juice plus enough water, (see package direction) to make a soft dough that can be rolled. Roll into a rectangle about in. thick.

Spread with galongong mixture. Roll from long side like a jelly roll. Place, seam side down, in greased baking pan. Pinch ends together. Combine with tomato sauce. Serves 6.

Guinisang Galongong

- | | |
|---------------------------------|------------------------------|
| 1 can galongong | Garlic |
| 1 bundle string beans | $\frac{1}{2}$ cup onion, cut |
| $\frac{1}{2}$ cup tomatoes, cut | $\frac{1}{2}$ cup "kinchay" |
| | (celery) |
| $\frac{1}{2}$ cup small shrimps | $\frac{3}{4}$ cup pork, cut |

Put the pork in a pan and cook until all the fat is extracted. Add the shrimps. When cooked put the garlic and then the onion and tomatoes. Then add the string beans, cover and cook until the string beans are soft. Add salt to taste. Lastly, add the galongong. Serves 6.

Galongong Souffle

- | | |
|--------------------------|-------------------------------|
| 1 can galongong | 2 cup milk |
| $\frac{1}{4}$ cup butter | 4 eggs, separated |
| $\frac{1}{3}$ cup flour | 1 $\frac{1}{2}$ teaspoon salt |

Melt butter on top of double boiler, blend in flour, add salt and milk gradually and cook over direct heat, stirring constantly until sauce boils and thickens. Beat egg yolk until light, stir in a little of the hot sauce, and pour back into rest of sauce; cook over boiling water, stirring constantly for 2 minutes. Remove from heat. Drain galongong, remove skin and bones, discard skin. Flake galongong meat, crush bones and add to sauce. Mix fish and sauce. Beat egg white until stiff and fold lightly but thoroughly into the mixture. Pour into greased pan and bake in a moderately slow oven (325° F.) for 1 hour. Serves 6.

Fish Loaf

- | | |
|---------------------------|--------------------------------|
| 1 can flaked galongong | $\frac{1}{2}$ cup chopped pork |
| 2 minced sweet red pepper | $\frac{1}{2}$ cup bread crumbs |
| 1 cup coconut milk | 1 teaspoon salt |
| 2 tablespoon lard | a pinch of pepper |
| 1 small onion | 3 eggs |

Saute the onions and flaked fish in a small amount of lard. Season with salt and pepper. Remove from fire, add the coconut milk, bread crumbs and eggs. Pour into a greased loaf pan, bake for about an hour in a moderate oven until brown. Set in a large platter, pour tomato sauce or kinchay around the fish loaf. Serves 6.

Galongong Salad Tropical

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|--------------------------------------|-----------------------------------|
| 1 $\frac{1}{2}$ cup flaked galongong | 2 tablespoon chopped sweetpickles |
| 1 cup diced ripe banana | 1 $\frac{1}{2}$ teaspoon salt |

- | | |
|-----------------------------------|--|
| $\frac{1}{2}$ cup diced pineapple | 1 tablespoon mayonnaise |
| $\frac{1}{2}$ cup dried celery | 1 tablespoon prepared mustard and crisp celery |

Mix together lightly all the ingredients. Arrange on lettuce. Garnish. Serves 4.

Galongong Salad a la Dagat-dagatan

- | | |
|-------------------------|------------------------------|
| 1 can galongong | 1 tablespoon lemon juice |
| 1 cup sliced celery | $\frac{1}{2}$ cup mayonnaise |
| 2 hard boiled eggs, cut | |

Combine galongong celery, egg and lemon juice. Chill. Before serving fold in mayonnaise.

Mold of galongong

- | | |
|-------------------------------|---------------------------------------|
| 1 can galongong | $\frac{1}{2}$ cup chopped ripe olives |
| 1 cup diced celery | 1 teaspoon onion juice |
| 1 cup diced cucumber | 1 teaspoon salt |
| $\frac{1}{8}$ teaspoon pepper | Pimiento |
| $\frac{3}{4}$ cup mayonnaise | Crisp lettuce |

Mix the galongong, celery, cucumber, olives, onion juice, spices and seasoning together. Mold in the shape of a heart on a lettuce leaf. Cut a pimiento in the shape of an arrow. Edge the heart with mayonnaise and place the arrow on top. Do this for each individual salad.

Galongong Empanadita

- | | |
|-------------------------------------|-------------------------------|
| 1 can galongong drained and flaked | $\frac{3}{4}$ teaspoon salt |
| 1 $\frac{1}{2}$ cup mashed potatoes | $\frac{1}{8}$ teaspoon pepper |
| $\frac{1}{2}$ cup onion, minced | $\frac{1}{4}$ cup lard |

Blend galongong, potatoes, onion, salt and pepper. Form into 3 inch patties about $\frac{1}{2}$ inch thick. Dip in flour and fry about 5 minutes on each side or until brown. Serves 6.

Escabecheng Galongong

1 can galongong	1 piece of ginger
1 tablespoon starch	1 onion, cut in pieces
Lard	1 green and red pepper
a pinch of salt	3 tablespoon sugar
	3 tablespoon vinegar
	1 cup water
	1 teaspoon salt
	1 tablespoon toyo
	Sweet sour sauce

Roll galongong in flour, then fry. Slice all the ingredients and saute. Add the sweet sour sauce then starch for thickening. Add this to the fish before serving.

Galongong Croquettes

1 can galongong	$\frac{1}{2}$ cup water or milk drained and boned
2 tablespoon fat	diluted with water (butter or margarine)
4 tablespoon flour	calamansi (lemon) juice water chestnut

First make a very thick white sauce by melting fat and combining with flour, then add the water or milk, stirring all the time to prevent lumps. Cook until very thick. Add to the flaked galongong to which you have added the lemon juice to remove some of the fishy odor. Add the chopped waterchestnut. Mix the whole thing very thoroughly, then set aside to cool and thicken.

Form into balls, then roll into slightly beaten eggs, then in bread or cracker crumbs, fry in a very hot lard. Serves 6.

Tortang Galongong

1 can galongong, drained	garlic
$\frac{1}{2}$ cup onion, finely cut	3 eggs
$\frac{1}{2}$ cup tomatoes, finely cut	lard

Flake the galongong. Saute all the ingredients until cooked. Set aside to cool.

Separate the yolk from the white and beat the white until frosty. Add the egg yolk and beat again. Pour $\frac{1}{2}$ on a hot frying pan. When cooked put the sauted ingredients and fold. Place in a serving platter and garnish, then serve. Serves 6.

Results and discussions

Appearance, taste and texture of the recipes tested have been rated from *good* to nearly *excellent*. Canned galongong when made into various recipes retains its characteristic texture and flavor with the resultant improvement in appearance and taste because of the ingredients added. Twenty recipes were made, all using canned galongong as raw material.

Efforts have been made to reduce the cost accounting of all the recipes without sacrificing appearance and taste. It has been estimated that the cost of preparing any of the twenty recipes for a service of six to eight persons would range from 40 centavos to one peso (U.S. Cents 12.5 to 31). It is believed that this amount would be economical enough to be within the reach of the people in the rural areas.

The materials and ingredients used are locally produced or imported. The tendency was to prepare recipes that could be prepared and accepted locally and abroad.

Conclusions

Twenty recipes were made using canned galongong, salmon style as raw material. Appearance, flavor and texture of recipes tested were approved by a taste panel. Sources and availability are

not influencing factors in the selection of ingredients for the preparation of the recipes. Galongong when canned in the salmon style can be prepared into a well rounded and attractive menu when fresh fish is not available.

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SEVEN NEW CRABS FOUND BY EMPEROR OF JAPAN

Seven entirely new species of crabs, which have been discovered by His Majesty the Emperor of Japan will soon be introduced to the world. The introduction will be made by Professor Tsune Sakai of Yokohama University, who has been assisting the Emperor in carrying out his research on crustaceans, through the periodical *Crustaceana* published by the Rijks Museum in the Netherlands. The magazine is the only periodical in the world devoted exclusively to crustaceology. The Emperor is well known as a biologist specialized in Hydrozoa, a small sea-animal rich in variety, and has conducted extensive studies in the waters of Sagami Bay. The seven new species are *Cryptocnemus kemekii*, *Leucosia sagamiensis*, *Randallia trituberculata*, *Libinia hatabumoana*, *Eurynome orientalis*, *Xantho maculata* and *Pinnotheres laquaeusi*. (*Japanese Information Office, Bangkok, Information Bulletin*, Vol. 9 No. 11, 1 June 1961).

GENERAL TRENDS

World-Wide Approach

In his paper presented in the November 1960 Meeting of the Gulf and Caribbean Fisheries Institute, Dr. Cecil Miles, FAO Regional Fisheries Officer for South America and formerly Secretary of the Indo-Pacific Fisheries Council, has presented a strong plea for a broader approach to warm water fish culture. Pointing out that there is but a scanty knowledge of the life histories of a large number of potentially valuable wild species, of the niches that they might fill and of their complementary combinations, Dr. Miles notes that the famous black bass/blue gill combination is only one of innumerable possible fish culture combinations. Dr. Miles also draws attention to the question of consumer acceptance and the possible impact of the introduction, particularly when these are followed by escapes into open water, of species which may compete with indigenous fish and quotes particularly the common carp, a fish of general acceptance in Europe and many parts of Asia but which is regarded as a plague and pest in certain countries. The author also deplores the fact that local experience with indigenous species is not generally utilized by workers in other areas and states that, although there is much information published and unpublished on fishes cultivated in different geographic areas, this fund of knowledge is put into little practical use outside the immediate place of origin. In offering a solution to the problem, Dr. Miles refers to the need for considerable funds being invested in investigating the life habits of many species of fish, especially in Africa and South America, in compiling existing knowledge, in the

actual exchange of species of fish between geographically distant countries and finally in experimentation in sufficiently large pond areas with a view to discovering the best fishes for each ecological niche. In conclusion Dr. Miles says that "it is, however, predictable that, given a 'critical mass' of conscientious research, the return will add up to many hundred times the investment".

Transplanting Pacific Salmon Into Atlantic

Norwegian fishermen in the Varanger area of Northern Norway adjacent to Russia have recently been catching pink salmon which were transplanted from the Pacific by the Russians. Along the Kola Peninsula and in adjacent ocean areas, including the Norwegian coast, there now have been 30,000 instances in which salmon (*Oncorhynchus gorbuscha*), has been taken by fishing gear. As long ago as in the 1930s the first attempts were made to plant Pacific salmon in the Murmansk fjord after Soviet researchers had determined that the hydrological conditions in the Barents Sea and the White Sea were similar to those in far eastern waters. The first attempt failed. In 1956, however, the attempts succeeded. At that time 2.4 million fertilized eggs of pink salmon (*Oncorhynchus gorbuscha*) and chum salmon (*Oncorhynchus keta*) from the Sakhalin (Siberia) area were transferred but it proved insufficient. In the Murmansk district the special hatcheries were expanded. In 1957, 13 million eggs were transferred; in 1958, 19 million; and in 1959, 21.6 million. For the first time in history, a species of salmon was transplanted successfully from one ocean to

another (striped bass and shad were transplanted successfully from the U.S. Atlantic Coast to the Pacific Coast many years ago). Conditions in the Barents Sea and the White Sea proved to be especially favorable for these salmon. The length of the mature pink salmon caught along the Kola Peninsula is from 30 to 52 cm. and weight is over 1.5 kg. In the Pacific Ocean they seldom weigh over 1.2 to 1.3 kg. In the fall of 1960 an additional 35 million pink and chum salmon eggs were transported by plane from Sakhalin and Kamchatka. At the same time the industry in Murmansk expected to handle eggs from the existing local species. A portion of the eggs will be hatched out in hatcheries which are on rivers on the Kola Peninsula; the remainder will be handled in hatcheries on rivers which flow into the White Sea. The purpose of this test is to determine where these new salmon species thrive best.

Herring From Baltic to Aral Sea

The successful transplantation of herring was reported by the Russians at the recent meeting of the International Council for the Exploration of the Sea held in Moscow. The roe of herring was transferred from the Baltic Sea to the inland Aral Sea which has a salt content similar to that of the Baltic Sea. There is now a fishery for herring in the Aral Sea that has developed from the transplanted eggs. (*Comm. Fish. Rev.*, Jan. 1961).

Oyster Purification

Scientific use of ultraviolet light is playing a vital part in extensive plans to develop Poole Harbor as one of the U.K.'s leading sources of oysters. One of the keys on which success may possibly rest is an installation using three 30-watt germicidal

tubes. All the oysters gathered by the group of part-time oystermen and also by the group formed of local professional fishermen are being passed through the plant. There are now more than 500,000 oysters laid in three beds, each of 12 hectares, in the harbor. Oysters gathered from the beds in the harbor are placed in one of two purification tanks $12.2 \times 3.05 \times 0.60$ m. deep, built by the group members at a small headquarters on the harbor foreshore. Then, over a period of 12 hours, the water in the tanks is circulated under the germicidal tubes. The 0.91 m. lamps are housed just above the water level in a 273 l. tank, through which the sea water from the main purification tank is passed at the rate of 227 l. per minute.

To ensure that the ultraviolet light focusses directly on all the water, this is passed at a wafer-thin depth, over a weir, which divides the 273 l. tank into two sections. Then as the sea water is being returned in the main tank, it is passed through an aeration system. Calculations show that the oysters need to be left in the main tank for only 12 hours. In that time, with the constant purification of the water, they pass out sufficient impurities to bring them well within the limits allowed by the Ministry of Health. (*Comm. Fish. Rev.*, Dec. 1960).

Oyster on Fiberglass

In the U.S.A., during studies on the growth of oysters off the bottom, a fiberglass raft was designed and built to support the weight of 881 lb. (25 U.S. bushels) of marketable oysters. This raft is a rectangular box with horizontal wings on each long side. The box is 3.8 m. long, 0.41 m. wide and 0.20 m. high. The wings are 3.8 long, 0.25 m. wide and 3.2 mm. thick. Each wing has two rows of holes

(8 mm. in diameter, 10.2 cm. apart). Nylon and plastic strings with experimental oysters attached are hung from these holes. A hole 2.5 cm. in diameter is drilled at each end for the attachment of a mooring line. Total cost of the raft was U.S. \$ 225. The raft weighs about 31.7 kg. and can easily be carried by two men. It is so designed that either the top or the bottom can rest in the water. Annually the raft is turned over and all fouling organisms are scraped off. The fiberglass raft has been moored in 3.05 m. of water at Taylors Pond, South Chatham, Mass., since 18 August 1958. During this time it has been subjected to strong winds and winter icing without any damaging effects to the structure. To date, use of the craft has proved successful as a method of growing oysters off the bottom. (*Progr. Fish-Cult.*, Oct. 1960).

Whalemeat for Human Consumption

The new Russian-built floating factory, SOVIET UKRAINE, and the whaling refrigerator ship, SEVASTOPOL, were commissioned in 1959. The factoryship daily can process 75 whale carcasses weighing an average of 50 tons each. The use of these ships has increased tremendously the amount of whale meat that can be processed in the frozen state for human consumption. The SOVIET UKRAINE is reported to be the world's largest and speediest whaling factoryship. It displaces over 44,000 tons, is 217.8 meters long, and has a 27.8 meter beam. Her 15,000 horsepower main engines propel her at 16 knots. She has a crew and factory staff of over 500 people. The ship's daily output consists of more than 1,000 tons of whale oil, 260 tons of ground meat and bones, and 100 tons of frozen meat. Only the fresh meat, the liver and the spermaceti, which is used for drugs, are frozen.

The best-quality blue whalemeat can be eaten by humans, the rest of the frozen meat is sold to fur farmers. All labor-consuming operations involved in processing whale carcasses, including meat, bones, oil, spermaceti and ambergris, have been mechanized. The freezing installation on board handles a total of 100 tons of meat a day. The meat is frozen in briquettes 800 by 500 by 100 mm. The installation consists of four parallel lines, each line made up of 11 vertical multiplate units. Before it goes into the freezing units, the meat is cut into small pieces. The frozen briquettes are discharged and also glazed by special machines. The freezing installation is equipped with a whole range of instruments, which reduces the work to an automatic process.

The purpose of the refrigerator ship, SEVASTOPOL, is to prepare, freeze and deliver whalemeat from the whaling grounds to shore factories. She displaces 8,970 tons, is 118 meters in length, and has a beam of 16.8 meters. Her speed is 17 knots. Of unlimited sea endurance, the SEVASTOPOL can sail in brash and patch ice. Her power plant consists of four main Diesel-generators rated at 1,250 kw. each and three auxiliary 450-kw. Diesel generators. She contains a total of 5,400 cubic meters of storage where a temperature of -18°C . can be maintained. Her tunnel-type air-flow freezing plant can handle up to 100 tons of meat daily. Cargo space comprises four holds and four 'tween-decks. Placed above the hatches of the No. 2 and No. 3 holds are the platforms on which the carcasses are dressed, and the bunkers to receive the meat. Steel cooling pipes carrying the cooled brine are hung on the walls and ceilings of the holds. The freezing and cold-storage plant is located in the midship body. This arrangement adds to the efficiency

of the process flow and to the handling of the finished product in the holds. Whalemeat is worked up and frozen by two, parallel, independent lines. The stock of whalemeat can be stored in the bunkers on either side of the dressing platforms. In the bunkers, the meat is cooled by sea water circulated through a brine-water cooler. Leaving the dressing platforms, the meat is fed into the cutters, which are mounted on the upper deck and are each capable of handling 60 tons. Cut into small pieces, the meat is transferred onto belt conveyors to be washed and delivered through inclined tubes into the receiving bunkers of the freezing department under the deck. From the bunkers the meat is fed by auger feeders onto tables. It is then placed on pans that are stacked on cages and then loaded into the freezing tunnels. Each of the two freezing lines consists of four tunnels accommodating eight cages at a time. The meat cooled down to -18°C ., leaves the tunnel to be unloaded from the cages in the glazing machine. The entire process—cage movement, opening and closing of freezing tunnel doors, and the gates between the freezing tunnels and air coolers—is completely automated. Frozen meat is delivered into the cargo holds for storage. (*Comm. Fish. Abstr.*, March 1961).

A New Fish Bait

A fish bait called Marinesol has been developed in Japan. Marinesol is, a bait containing a scientifically-prepared colloidal solution that swiftly disperses in water, spreading an appetizing aroma of fish food. Marinesol is sold in aluminium containers of various sizes ranging in weight from a few grams to over a half ton. When an aluminium case containing the bait is lowered into the ocean, huge schools of fish are attracted to it because

of the appetizing smell it produces. Marinesol was developed primarily for the use of commercial fishermen, but it is also being sold in convenient sizes for the private angler as a compact case containing six capsules no larger than the average-sized cartridge, costing, including a special case, less than one U.S.\$.. The special case that comes with the kit is used to lower the capsule containing the bait into the water. As soon as the capsule is lowered, the bait is pressure-squeezed from tiny pores in the case and spreads in the water. The bait is effective for about one hour, during which it attracts fish from the surrounding area and lures them right up to the hook of the angler. Besides the essence of bait, Marinesol contains pressurized gas which serves to squeeze the bait out of the container and disperses it in the water. The gas has another function. By creating a stream of bubbles when it escapes from the container, it attracts fish in the neighbouring area by agitating the water. By taking advantage of their sense of smell, fishermen have long used groundbait to lure fish to their hooks or nets. Ground-bait is made by crushing such fish as sardines and mackerel pike into a finely-ground meal. The bait attracts large numbers of fish, but it has a drawback, which is that fish sometimes gorge themselves on the proffered food but refuse to nibble at the hook. In any event, ground-bait is expensive and bulky because large amounts have to be scattered to attract the fish. Marinesol was developed to replace this expensive and bulky bait. In a test carried out in the Japan Sea recently, 15.9 kg. of Marinesol was left for two hours at a depth of 36.6m. A survey carried out by a supersonic device after the two hours showed that from 40 to 120 tons of fish had been attracted to the container. Marinesol is put in containers

under heavy pressure which enables the bait to be squeezed out of the container at a depth of about 67 m. Ground-bait, on the other hand, can be used to a depth of only about 9.1 m. Marinesol can be used to attract such fish as salmon, trout, tuna and bonito. It is just as effective when used in fresh water as in salt water. (*Japanese Information Office*. Bangkok, 15 February 1961).

Hydraulic Powerblock

A new block with hydraulic powered sheave, developed in U.S.A. to speed the handling of crab pot and longline gear consists of a hydraulically-driven block, having a bronze V-sheave that can be preset to handle lines from approx. 8 mm. to 16 mm. diameter. The block is suspended from a boom that can be hydraulically raised or lowered. Fishing with a crew of two men, it was possible to handle 45 pots in 50 minutes with the new block—each pot weighing approximately 500 lb. loaded—using an average 64 m. pot warp per pot. This included catching the pot buoy, hauling the pot warp, unloading the pot, baiting it, returning it to the water and sorting the crabs. In crab fishing, the boom is swung outboard so that the block clears the side of the hull. The operator then hydraulically lowers the boom, so that when the buoy is picked up, the pot warp can be placed in the V-sheave. The boom is then hydraulically raised so that when the pot is raised it will clear the bulwarks. The sheave is hydraulically turned and the pot warp goes over the sheave back into the water. When the pot clears the water and reaches the maximum height, it is pulled inboard, and the operator reverses the sheave at the same moment. The boom is lowered and the pot warp is lifted off

the sheave. The block is then ready to receive the warp from the next pot. (*Fisheries Newsletter*, April 1961).

Freshness of Shrimp

Changes occurring in physical and chemical properties of drip from shrimp, held in iced and frozen storage, have been studied in U.S.A. for use as possible improved quality indices for the freshness of shrimp. The pH and color changes of shrimp drip appeared to be satisfactory objective indices of shrimp quality. The pH appeared to be useful both as a spoilage test and as a freshness test to show the changes in quality before spoilage. This test was sensitive to changes before other objective tests were, such as trimethylamine-nitrogen. Color changes in drip followed a definite pattern from colorless and transparent for "good" quality shrimp, through amber and translucent for "acceptable" quality shrimp, to brown and opaque for "unacceptable" quality shrimp. Changes in optical density of shrimp drip increased with decrease in quality. Trimethylamine-nitrogen was of no value as an indicator of pre-spoilage change in quality of shrimp, but it was a good indicator for the onset of spoilage. Determinations of volume of drip and of Folin-Ciocalteu nitrogen content of the drip were of no value as quality indices. The pH of the drip was slightly higher than the pH of the whole shrimp, but the magnitude of the changes in pH when the shrimp changed for "good" to "acceptable" quality and then "unacceptable" quality were no greater for the drip than for the whole shrimp. The only advantage in the use of drip for taking pH is for measurements on the whole shrimp. The observation of the color and transparency of the drip as an indication of

quality would be useful under conditions where the usual laboratory equipment is lacking. (*Comm. Fish. Rev.*, Jan. 1961).

Fish Boxes

The British Ministry of Health and Ministry of Agriculture and Fisheries have issued two codes of practice for the hygienic handling of fish; one for retail and the other on the transport and general handling of fish. The second has some interesting notes on the durability, maintenance requirements, and insulation and hygienic rating of the various types of fish boxes used in the U.K. The all-metal container rates high for hygiene and durability, but presents maintenance problems and its insulation value is noted as "not good". The liner crate has fairly good insulation and good durability, but the component parts must be cleaned separately to achieve a good standard of hygiene. The plastic sprayed wooden box is rated highly on all counts, but it is emphasised that its hygienic value depends on the condition of the plastic coating which must be cleaned immediately after fish is taken out of the box. The returnable wooden box is noted as being difficult to clean thoroughly, but in other respects is almost as good as its plastic sprayed counterpart. The non-returnable wooden box is practically as good as the returnable one for insulation and "probably offers the most hygienic method of all for the transport of fish". At Sydney Fish Market a British sanitary coating for fish boxes known as Holdkote is being tried. It is said to be the result of several years' research and experiments and to be now widely used for trawlers' ponds. It is supplied, for holding purposes, as a separate varnish base and a catalyst which are mixed together before use. It can be painted on or sprayed, and is claimed to

be resistant to chemically prepared ice, fish juices, ammonia and cleansing solutions. (*Fisheries Newsletter*, April 1961).

Liquid Nitrogen

One of the most exciting new prospects in the frozen food industry today is the use of liquid nitrogen to provide refrigeration both in processing and during transit. The technical feasibility of this method of refrigeration has been proven, but the economic feasibility of the method is still to be resolved. The method of operation is simple. Food is taken directly off the processing line and is carried through an insulated cabinet containing a pool of liquid nitrogen. The food is subcooled rapidly by direct heat exchange and the vaporized nitrogen is withdrawn through vents and recirculated to the liquescfaction unit. The processed food can be cooled from 82.2°C to -20.6°C. in less than 5 minutes. When the food leaves the freezing chamber it is conveyed to the packing line and then is taken directly to insulated railroad cars or truck trailers that also are refrigerated by liquid nitrogen. The key to the economics of the process are the method of insulation employed in the cooling chamber and in the transit cars and the cost of the liquid nitrogen. Adequate low-cost materials for providing insulation at the low temperatures involved are provided by the foamed polystyrene and polyurethane resins that have appeared on the market during the past few years. Even more significant than adequate insulation is the cost of liquid nitrogen. The economics of liquid nitrogen plants are strongly influenced by the volume of production. Impelled largely by guided missile demands, considerable progress has been made in this field in recent years. One company in U.S.A. reports that a plant producing 200 liters per week of liquid

nitrogen will have a 5-year payout at a price of 30 cents per liter, whereas a plant producing 1,000 liters per week yields the same payout at a 10-cents-per-liter price. The most promising method of operation is to run the almost completely automatic liquefaction plant around the clock and store the liquid nitrogen during periods when the food-processing line is closed down.

The amount of nitrogen consumed during the refrigeration of foods depends upon (1) the time and distance of hauling, (2) the temperature required during transit, (3) the food being handled, and (4) the effectiveness of the car insulation. As a rough rule of thumb, it has been suggested that liquid nitrogen cooling will prove competitive for food-processing plants that turn out at least 75 retail packages per minute on an 8-hour day. Another measure of economic feasibility is a daily shipment of 10 tons on trips of at least 3 days duration.

The key to the success of using liquid nitrogen for the freezing of food-stuffs is the ability to achieve an exceedingly rapid rate of cooling—a few minutes compared with the many hours required with conventional freezing methods. Further benefit is ascribed to the displacement of oxygen by means of nitrogen. If economics live up to the expectations of the optimists it will become a means for expanding the line of frozen foods, simplifying food-processing operations, and for extending the competitive shipping range of food-processing plants. (*Comm. Fish. Abstr.*, Feb. 1961).

Freeze Drying

A new food-preserving process, which reportedly increases the shelf life of foods to approximately two years, has

been commercially developed by a British company. The process, known as Accelerated Freeze-Drying, will be used commercially for the first time by a British firm for a wide range of vegetables slated for export. Installation is expected by February 1961. It is reported that this new process provides a logical advance in the prepacked food market and an alternative to deep-freeze methods of food preservation. Technically, the process employs heating and drying of foods in a vacuum. The food is maintained at temperatures below freezing while it still has water content. In this way, the moisture in the frozen state converts to vapor without passing through the liquid phase. The effect is that all the natural flavor and color of the food is restored when the water is replaced. The process does not collapse the cells of the food. With the addition of water, the food regains its natural fresh appearance. Besides cutting earlier standard freezing process time by one-third, food processed by Accelerated Freeze-Drying weighs less than half the normal weight of food. As a result, transportation costs are drastically cut. Foods processed by Accelerated Freeze-Drying have been subjected to various tests. Numerous tasting panels have judged the quality of the products to be equal to fresh foods and superior to foods preserved by other methods. The British army has been conducting trials using freeze-dried foods to determine their applicability for use in the armed forces. Both the decrease in weight of the products and their compactness were cited as especially important factors. Foods subject to freeze-drying could either be cooked in advance or processed raw. The only thing really required is to cut them sufficiently to enable the

process to work on the food surface equally. Originally, extensive research and development on the new process was carried out by the British Ministry of Agriculture, Fisheries and Food. The new system of dehydration was discovered accidentally about five years ago at the Ministry's Aberdeen, Scotland, experimental factory. An accident during experiments with a new vacuum-drying process actually brought about the dis-

covery of freeze-drying. The food was first frozen and then placed between heated metal plates which turned the ice crystals into vapor without melting them. At this time, someone accidentally left open a valve in the machinery. A severe vacuum was set up which froze the food solid and caused the dehydration process to be cut to one-sixth the ordinary time. As a result, the drying time was reduced from 48 to 8 hours. (*Comm. Fish. Rev.*, Dec. 1960).

NEWS FROM THE REGION

AUSTRALIA

The South Australian minimum length for spiny lobster, *Jasus lalandii*, has been raised from 22.9 to 25.4 cm. (9 in. to 10 in.). This increase applies in all areas of the State except the Victor Harbour area, where the minimum length of 20.3 cm. (8 in.) for male spiny lobsters is retained. In addition, the closed season for females throughout the State has been extended to include June. The closed season will now be from 1 June to 31 October. In the Kangaroo Island

Fishery, the closed season for males, from July to October, has been extended to include June. In other words, in that area no fishing for either males or females can be done from 1 June to 31 October. Spiny lobster production in South Australia during the past two years has decreased by approximately 20% each year, and the 1959/60 production of approximately 1,587 tons (3.5 million lb.) was the lowest since 1952/53. (*Comm. Fish. Rev.*, Feb. 1961).

BURMA

Shrimp fishing in Burma is carried on along the coastal regions, and in the lower Irrawaddy Delta. Kyaukpyu Island, Ye Township, and Mergui and Pyapon Districts are the large-scale fishing and processing centers. Coastal shrimp fishing is carried on mainly during the dry season (November-May) due to the rough seas during the rains. The heavy run-off of rain water from the coastal areas over the shallow sea shelf drives the shrimp out to sea during the rainy season. Delta fishing is carried on the rainy season only. Shrimp are caught with various kinds of gear made of twine, split-bamboo,

wooden logs and poles. The principal types of gear are the hand net, fish trap and floating raft with a net fixed on each side. Fishing gear is licensed and taxed by the Government. Fishing grounds are leased by the Government and are auctioned annually. Processed shrimp are mainly of three kinds: sun-dried, after boiling; smoked; or ground into paste and preserved with salt (called ngapi). A by product of ngapi is Nganpya-Ye (shrimp sauce) which is the juice from ngapi collected separately. Shrimp "brains" are preserved in sesamum or

groundnut oil, and sold as shrimp oil. Retail prices of sun-dried shrimp range from Kyats 12-18 per viss or 3.6 pounds (US\$0.70 to \$1.05 per lb.), according to quality; smoked shrimp Kyats 8 to 9 per viss (US\$0.47 to \$0.53 a lb.) for inferior quality and Kyats 14 to 18 per viss (US\$0.81 to \$1.05 per lb.) for superior quality; and shrimp paste Kyats 3 to 5 per viss (US\$0.18 to \$0.29 per lb.). Price of shrimp sauce is about Kyats 3.50 per viss (US\$0.26 per lb.), and shrimp oil Kyats 10 per viss (US\$0.58 per lb.). In Burma, shrimp and shrimp products are very popular and a staple part of the diet. In the upper tidal zone, fishing goes on from June to September, and in the lower zone from July to November. The peak season is during July and August. Fishing is generally done for 12 to 14 days a month when the tidal current is strong. Along the coastal region the operation is intensively carried on in dry season, though there may be irregular fishing during the rains. Primitive methods are still used for processing shrimp on a large scale. They are boiled and dried in the sun. When sun is lacking, the shrimp are smoked over a fire. Fresh shrimp is pounded into paste (ngapi) and then preserved with salt. Labor being cheap, the need for mechanization has not yet been felt. Shrimp paste processing has been mechanized recently to a small extent. Motor mincers for grinding raw shrimp are used. The motors are run by gasoline or electrical power. Other operations are performed manually.

The Government's Union of Burma Applied Research Institute is carrying out studies of improving food preservation, canning and processing, with the assistance of a FAO food processing and hygiene expert. The establishment of standards and specifications for the manufacture of shrimp paste is to be the first step taken in food standardization in Burma. A commercial type of standard fish-drying chamber has been designed, and is being tested, which may be usable for shrimp. According to the FAO expert, small-scale shrimp canning plants with a daily output of 300 to 500 cans would prove to be profitable. No statistics are available for shrimp landing; however, the following estimates for heads-on shrimp have been made; 1960, 6,700 metric tons; and 1959, 5,200 tons; 1958, 6,600 tons; 1957, 6,500 tons; and 1956, 6,400 tons. The shrimp catch consists mainly of Pa-zun-zait ($\frac{1}{2}$ -inch or 1.3 cm.); Pa-zun-kyawt (1 inch to 2 inches or 2.5 to 5.1 cm.); Pa-zun-gya (3 inches to 4 inches or 7.6 to 10.2 cm.), and Pa-zun-dok (5 inches to 9 inches or 12.7 to 22.9 cm.) shrimp. Shrimp paste and dried shrimp are usually made with the first two sizes. No trawlers are used for shrimp fishing. Local craft (dugouts, and plank-boats made of timber) are operated for both sea fishing and river fishing. Country craft are owned by the fishermen themselves. Motors of the transport craft are imported generally from the United Kingdom, India, Japan or Germany. (*Comm. Fish. Rev.*, Feb. 1961).

CEYLON

Fishing Enterprise

A joint Ceylonese-Japanese fishing enterprise with an authorized capital of 5 million rupees (about US\$1,054,000), started operations in August 1955 to catch

and market tuna, marlin and sailfish. Landings in 1959 totaled 1,134 tons (2.5 million lb.) valued at a little over 2 million rupees (\$421,800), of which Rs. 600,000 was reinvested. The company is

currently negotiating for a loan of two million rupees from the Bank of Ceylon to construct a freezing plant and to buy more boats to increase its production and to export frozen tuna, spiny lobster tails and shrimp. It also plans a canning factory with a capacity to can $4\frac{1}{2}$ tons (10,000 lb.) per day. The total investment is estimated at Rs. 3 million (\$632,600), the land and buildings to cost Rs. 325,000 (\$68,500). (*Comm. Fish. Rev.*, Jan. 1961).

Mechanization

In 1951, the Ceylonese government decided to start to mechanize the fishing boats using the advice of FAO Experts and utilizing boat designs first developed by FAO naval architects in India for Indian fishing vessels. Many hundreds of existing boats were mechanized. Then in 1958, an ambitious plan called for 8,000 mechanized boats to be built within the next 10 years. An FAO expert in boatbuilding studied the Ceylonese methods of boatbuilding and the purpose for which the boats were needed, then designed a boat which introduced many improvements and is included among the 600 mechanized boats built in Ceylon during the past two years.

Even the teppams (log rafts) could be mechanized with outboard motors, boosting the Ceylonese fishermen's catch by almost 600 percent and their income by 300 percent. Five h.p. outboards were put on big teppams. Without the engines, the boats averaged a catch of 162 kg. of fish monthly or 6 kg. daily, valued at 185 Rupees. With the engines enabling the teppams to reach the distant and deeper fishing grounds, the mechanized rafts averaged 1,104 kg. of fish monthly or 41 kg. a day, a catch valued at 1,462 rupees. This increase in catch—a 580 percent gain—was recorded in August, which is considered a bad fishing month.

There is a difference between mechanizing a boat, designing it for an engine plus net handling gear, and motorizing a boat by the use of an outboard motor. Some 2,500 of the 7,500 large 9.1 m. teppams used in northern Ceylon could be motorized according to the FAO Expert. The expert plans to start experimenting with motorizing the small, 4.87 m. teppams used in southern Ceylon to see if the outboard motors will bring as good results as they did on the larger teppams in northern Ceylon.

HONG KONG

The Quarterly Report (1 Jan.-31 March 1961) of the Cooperative Development and Fisheries Department gives the following information.

Fishermen's Societies

Three new societies were registered during the quarter and one Thrift Society extended its activities to embrace credit. Longliner fishermen normally obtain their fish bait from the purse-seiner fishermen; unfortunately, these last few months have

been the purse-seiner slack season and consequently there has been a shortage of longliner bait. This shortage of bait has caused the longliners difficulties: not only have prices been high, but in some cases fishing trips have had to be curtailed because of insufficient bait. To help to overcome this problem, the Federation of Fishermen's Societies in the Southern District, which already operates an ice supply service, has initiated a scheme to buy and store bait for sale to individual

members. The Shaukeiwan Mechanised Longliner Fishermen's Co-operative Society allocated \$10,000 from its Revolving Fund to capitalise an ice supply scheme, which operated efficiently during the quarter and which provided a much appreciated service. The Fish Pond Society in the Luk Keng Village achieved a good harvest during the quarter, selling fish to the value of HK\$7,000; a monetary return sufficient not only to meet its operational expenses, but also to enable the Society to repay the greater proportion of its loans.

Fish Marketing Organisation

Fresh fish landings marketed through the Fish Marketing Organisation during the quarter totalled 181,337 piculs. Due mainly to the cessation of fishing activities during the Chinese New Year period and less favourable weather conditions in January and February, landings of fresh fish decreased by some 3% as compared with the preceding quarter and by 13% in comparison with the same quarter of last year. The weather affected principally in-shore fishermen and, as a result, longliners were unable to obtain their full bait requirements. The position improved in March when in-shore vessels were able to operate more fully. As in the previous quarter, the average wholesale price was high, \$93 per picul. At the same time, imports of pond (fresh water) fish from China upon which the Hong Kong market relied for over 90% of its supplies have decreased to about one third of normal imports and this has caused an increased demand for fresh marine fish.

The Fishing Fleet

A pair of 28.65m. Japanese type trawlers, each powered with 250 b.h.p. engines, arrived in February, and are undergoing minor modifications to enable

them to be registered as British ships. These vessels were purchased by one of the local fishing companies with the aid of a HK\$300,000 loan from the Fish Marketing Organisation Loan Fund. They bring the number of vessels of this type now operating with the local fishing fleet up to 26. The keels for a pair of new, modified 'Kwong Sun', type junk trawlers, financed by loans from the Fisheries Development Loan Fund, were laid in a local junk-building yard on the 31st March. These boats are planned to be powered by 240 b.h.p. Diesel engines, and will be the first of any local fishing Junks to be fitted with engines of such size and power. An important departure from traditional design will be the incorporation in the construction of these vessels of features which, it is hoped, will improve their fishing efficiency; in particular, the vessels are to have prouder heads to improve sea-kindliness and reduced accommodation space at the stern which will result in a larger working area. Local fishermen have displayed great interest in these plans and will no doubt follow their progress closely. Thirty-six more of the larger mechanised shrimp trawling junks have been equipped with power-driven warping barrels, cheaply constructed from second-hand motor vehicle back-axes. This sudden increase in the introduction of mechanical equipment to assist in the handling of the trawl warps has been accelerated by the difficulties experienced by trawler operators in recruiting employees, who are reluctant to serve on vessels equipped with hand-operated windlasses. The fish holds of a further seven mechanised deep sea junks have been fitted with 5.1cm. (2 in.) thick insulated linings. This is a recent innovation; in the few previous cases where fish holds have been insulated, material of only 2.5 cm. (1 in.) thickness has been used.

A modern, heavy-duty trawl winch, suitable for use on deep-sea trawlers-which can be constructed locally for substantially less than the cost of comparable imported equipment has been designed by officers of the Department, who have also designed and had constructed a warping barrel which has been fitted on to the back-axle trawl winch already installed on the Fisheries Division's in-shore wooden boat 'Yuen Ling'. Drawings were prepared for one of the leading fishermen of the Tai Po district, illustrating how a proposed 12.2 m. mechanised long liner junk that the fisherman intends having built could be improved at very little extra cost. These recommendations have been accepted, and will be incorporated in the vessel. Three hundred and nine mechanised vessels, including 113 newly built craft, joined the fishing fleet during the quarter, to bring the total number of mechanised fishing vessels operating from the Colony to 3,520. One hundred and eighteen former mechanised fishing vessels either reverted to sail or transferred to the motor trading register.

Training Classes

The first of a new series navigation classes for fishermen commenced at the Aberdeen Fisheries Office on the 3rd January. Eleven candidates, all from mechanised deep sea junks based at either Aberdeen or Shau Kei Wan, are taking this course, which will last six months. The aim of the course is to acquaint the fishermen with the principles of navigation by 'dead reckoning', using charts to assist them in undertaking longer fishing trips in more distant waters. Forty fishermen, trained by the Division, obtained the 'modified coxswains' certificate from the Marine Department, valid for bona-fide fishing vessels only. The final

examinations for the first class of junk builders, who have received a course of instruction in reading plans and on the 'laying-off' of the lines of boats, were conducted early in February. Ten of these students were successful. A second boat-building class, with 19 students, commenced on the 8th February.

Oyster Culture

Two of the Pearling Companies operating in Tolo Channel harvested small quantities of pearls during the quarter. Very little embedding was done as the water temperature was considered to be too low. The collecting of adequate supplies of wild pearl oysters is becoming increasingly more difficult, possibly because of the poor spawning season last year, coupled with fairly intensive collection of these oysters by local fishermen for sale to the pearling companies.

The Fisheries Division supervised the harvesting of 104,490 catties of fresh edible oyster flesh from the beds at Deep Bay for conversion into dried oyster meat and oyster juice for export. A further 58,430 catties of fresh oyster flesh was harvested for local consumption. The wholesale prices varied between \$2 and \$2.80 per catty, and the total financial yield for the 3 months under review is conservatively estimated to have been worth over HK\$400,000.

Fisheries Research

The research vessel CAPE ST. MARY embarked on a short shake-down cruise. The purposes of this expedition were to work out a programme for the collection of oceanographic and catch data, and to familiarise the crew with the use of the new sampling equipment. From the experience acquired during this trip a routine schedule has been drawn up for

future exploratory surveys. The CAPE ST. MARY left Hong Kong again on March 20th for an extended cruise of some three weeks duration in the Gulf of Tongking. Fishing in the vicinity of Tiger Island, she has reported catches averaging some 2,500 catties per day. The pond at Au Tau has been sterilised prior to restocking in the Spring. A programme of research has been drawn up in which the specific food requirements of all the species of carp and the grey mullet, commonly grown as a mixed culture, will be investigated. The analysis of catch statistics and market landings is being continued and a taxonomic study of all fish species occurring within a range of some 500 miles of Hong Kong is being undertaken. Observations on pearl oyster growth have continued. The Station's stocks of oysters, now held at Lo Foo Fat, will be transferred to Kat O as soon as the proposed pearl culture Research Station has been built there.

Tentative plans for this station have been drawn up and approximate estimates achieved.

Conference

The Senior Research Officer, accompanied by the Craft Technician of the Fisheries Division, represented Hong Kong at the 9th Session of the Indo-Pacific Fisheries Council, held in Karachi in January.

Personnel

Mr. J.D. Bromhall, on secondment to the Department from the University of Hong Kong since August 1st 1960, was appointed Senior Research Officer with effect from January 1st. Mr. T. Chow and Mr. C.Y. Chu, Assistant Research Officers, previously employed in the Fisheries Research Unit of the University, were also appointed with effect from January 1st. Mr. C.Y. Tung and Mr. Lin were appointed Assistant Research Officers.

INDIA

Shrimp Industry

The shrimp fisheries currently being exploited by Indian fishermen are primarily close to the coast and in the estuaries, backwaters, and salt-water lakes along the western coast of India, especially around Kerala and Bombay, and to a much lesser extent off the east coast. The shrimp fishing grounds on the west coast extend to 50 miles from the coast in the north (off the Gulf of Kutch), to about 40 km. from the coast at Bombay, and to about 25 km. off the coast in the south at Cochin. East coast shrimp fisheries are being surveyed and potential catches appear to be great, especially off Tuticorin, Cuddalore, Pulicat, the mouths of the Godawari and Mahanadi Rivers, and at the head of the Bay of Bengal. There are 11 processing plants in India.

All but the plant at Kozhikode process shrimp and all are freezing plants. One plant at Cochin and the one at Mangalore also can shrimp. The estimated landings of heads-on shrimp in India are as follows; 1959, 65,437 metric tons; 1958, 85,191 tons; 1957, 137,000 tons; and 1956, 160,000 tons. No breakdown of the landings by major types or species is available, except that the 1959 catch consisted of 27,632 metric tons of *Penaeid* shrimp and 37,805 metric tons of non-*Penaeid* shrimp (head-on). No estimate of landings for 1960 is available yet. It is not clear why landings of shrimp have fallen so sharply in the last three years. It is believed that reclamation of backwater areas for paddy cultivation may cut into the output of the small shrimp caught in such areas. Such a trend was not likely to continue because

of the conservation measures being taken, but on the other hand, the future increase in the shrimp catch would be primarily the result of extending exploited fisheries outward from the shore rather than of more intensive exploitation of backwaters and close-in fisheries. It has been estimated that in 1959 there were about 86,700 fishing vessels in India, including about 1,700 mechanized craft. All vessels are primarily Indian-owned, but there are two fishing companies exploiting shrimp fisheries for export which involve foreign minority participation. One of these is 49 percent owned by Japanese interests, and the other recently-formed company has 49 percent U.S. participation. The joint Japanese-Indian company has four bull trawlers, while the company with U.S. capital is to have six vessels in Visakhapatnam and six in Tuticorin.

Exports to the U.S.A. are primarily frozen shrimp, while shrimp sold to Burma (the other most important customer for Indian shrimp) are mostly dried.

The Indian Government imposes a tax of Rs. 0.75 (\$0.16) a hundredweight (112 pounds or 51 kg.) on exported shrimp, to finance research projects connected with the shrimp fisheries. At present the Government is considering a proposal to eliminate the tax. Shrimp exports are not subsidized, but the Government assists in the establishment of facilities for catching and preparing shrimp for export in several ways, such as through facilitating issuance of licenses for imports of packaging materials and extending loans to new companies. Further measures, including a subsidy on tinplate and remission of the duty on imported packaging materials, are under consideration. Fishermen typically either sell their catch to middlemen daily or, apparently

in fewer cases, make arrangements before the season begins for delivering their entire season's catch to a middleman at a predetermined price. The Indian Government expects to conduct a comprehensive survey of the income of fishermen which, however, will not be completed before 1963.

It appears that India is at present catching only a small fraction of the potential output of its shrimp fisheries. Deeper waters than are now generally exploited and the fisheries off the east coast, which are practically untouched offer the primary opportunities for expansion. Despite uncertainty of the reasons for the decline in production of shrimp during the past few years, it seems probable that the trend will be reversed because of the Government's increasing interest in exploitation of fisheries to improve the Indian diet and ease India's serious foreign exchange situation through exports, and because of the generally developing interest of foreign, particularly Japanese and American, investors in exploiting Indian shrimp fisheries for export. (*Comm. Fish. Rev.*, Feb. 1961).

Japanese Aid

Two fishery development projects to be undertaken with Japanese collaboration have been approved by the Indian Government for inclusion under the US\$50 million credit agreement between India and Japan. A large Japanese fishing company will collaborate with an Indian company in shrimp fishery operations at Cochin. The second project involves a survey of the Mangalore coast in Mysore State. Other Japanese firms are reported to be negotiating with Indian companies for the formation of joint ventures for fishing operations, ice-making, cold-

storage and canning plants, and the manufacture of fish nets. The projects appear to be the direct outcome of India's increased interest in exploitation of the considerable fishery resources along the Indian coast and in the Indian Ocean and the resultant visit to Japan in March 1960 of a three-member team of Indian officials. (*Comm. Fish. Rev.*, Dec. 1960).

New ice and Cold-Storage Plant

A new ice and cold-storage plant, built with U.S./ Technical Cooperation Mission (TCM) assistance, was inaugurated on 24 October 1960, at Versova, a suburb of Bombay (about 15 miles north of the city), India. The plant, which has a production capacity of 11 long tons of ice per day and provides cold-storage space for 30 tons of fish, was established by the Versova Fishermen Multipurpose Cooperative Society Limited. Organized in 1948, this cooperative is considered to be one of the best industrial cooperatives in Maharashtra State. Machinery valued at Rs. 148,000 (US\$31,080) was provided by the TCM under one of its aid programs for the development of fisheries in India. The buildings costing approximately Rs. 150,000 (\$31,500) were constructed by the cooperative from its own funds and from subsidies and loans received from the Maharashtra Government. The Bombay City area fishermen will be benefited in two ways from the operation of the plant. They can obtain supplies of ice at relatively cheap prices instead of depending on ice manufacturers in Bombay who allegedly charge excessively high prices during summer months. In addition, they can store the surplus catch in cold storage to help stabilize fish prices. The members of the Versova cooperative own and operate 450 fishing vessels and 250 "tonies". About 150 of the boats are fitted with marine Diesels,

of which about one-third was supplied by the TCM. The cooperative owns 11 trucks to transport fish from Versova to the markets in Bombay. It also owns two retail stores which sell Diesel oil and fishing accessories. (*Comm. Fish. Rev.*, Jan. 1961).

Gujarat Fisheries

The Directorate of Fisheries, Gujarat, has set up a Survey and Research Division and the program of work envisages the following:

1 - Pearl Oyster Research

This is a continued scheme. The Bionomics of the Pearl Oyster, *Pteria vulgaris* and the population survey are the main items of study. One paper has already been published (Gokhale, Easwaran and Narsimhan, 1953) while another on experimental pearl fishing and sample survey is under preparation. During the current year, the following will be undertaken: (a) Spawning season has to be ascertained. This will be done by macroscopic and microscopic studies of the gonads, variations in the condition factor and gonad-weight/body-weight ratio. (b) Age and size at first maturity. In the previous studies age at which pearl formation starts has been ascertained, but at that time only the thickness at the hinge was taken into account. Now all the measurements are to be taken and correlated with Annual Rings. (c) Transplanting experiments. These are to be conducted at certain selected areas so as to increase the population of oysters.

2 - Studies on the prawn fishery of the Gulf of Kutch

The Gulf of Kutch sustains a profitable prawn fishery, majority of the catch coming from the back waters of Malia-Surbari area at the head of the Gulf. Along

the Kutch coast as well as on the Halar Coast prawns are fished throughout the year but the fishing is confined to inshore areas (i.e. less than 4 fathoms deep). The fishery especially in the backwaters is sustained by the 'O' group prawns and depends entirely on the brooders which migrate inwards from the Gulf. It has therefore been decided to study in detail the behaviour of the prawns, their migration and the spawning grounds.

3 – Studies on the Bionomics of the Silver Pomfret, *Pampus argenteus*

The Silver Pomfret forms one of the most lucrative fisheries on the South Saurashtra coast. In terms of money it represents nearly 4.5% of the total output, yet very little information is available regarding this fish. It shows sporadic migration from South to North and from offshore to inshore regions. Detailed study on its feeding and spawning habits as well as its migration are proposed to be undertaken.

4 – Studies on the Bionomics of the Bombay Duck – *Harpodon nehereus*

The Bombay Duck fishery is the base of the fishing industry of Gujarat, forming as it does nearly 60% by weight of the total fish landings of the State. Recent studies suggest that there are two different stocks of this species. Very little information, however, is available on its migration, spawning and feeding. It is therefore proposed to carry on investigation on the bionomics and see if there is any migration or if there are two independent stocks.

5 – Studies on the fauna of the intertidal zone in the Gulf of Kutch with special reference to the window-pane oyster, *Placenta placenta*

Okha, at the mouth of the Gulf of Kutch is a veritable paradise for a marine biologist. Different types of substrata such as sandy, muddy, shelly, coral, rocky etc. are available in the near vicinity facilitating studies of animals and plants of different habitats. Extensive window-pane beds are also located in the neighbourhood. These oysters yield pearl dust which has been quite important from the revenue point of view. The fishery has, however, been put to a severe strain and, in the past, had to be closed down due to overfishing. It is, therefore, proposed to make a detailed study of the ecology of the area. A reference museum has also to be established to help the college parties which go to Okha for collection purposes. It is also proposed to watch the stock position of the window-pane oysters regularly and to ensure that overfishing does not take place.

6 – Compilation of the fish fauna register

Along the coast of Gujarat more than 200 species of fish are known to occur. They are known by different local names, often names for adult and juveniles of the same species being different. Similarly there has been some change in scientific nomenclature. The fishery workers therefore find it very difficult to identify the species correctly. It has therefore been decided to publish a catalogue of the

species giving their vernacular names and the most recent scientific names. Information on the fishing grounds, mean size of the fish in commercial samples etc. will also be included in this catalogue.

7 – Fish and fishery of Nal Sarovar

The Nal Sarovar in Mehsana District is a very extensive reservoir and supports a large variety of fish fauna. Many of the major carps are found here in sizable quantities. It has been decided to conduct a systematic study of the fishes and also to obtain detailed information on spawning, feeding etc. of the important species.

8 – Studies on the *Hilsa* fishery of Gujarat

Two species of *Hilsa*, *H. toli* and *H. ilisha* constitute a very important fishery on the South Gujarat Coast. Recently

there have been some complaints of depletion especially of *H. ilisha* on this coast. It has, therefore, been decided to conduct investigations on the spawning and feeding migrations of both the species and to locate the spawning grounds of *H. ilisha* in the Narbada and Tapti rivers.

9 – Mesh experiments

At present, Veraval fishermen are using drift nets mostly having 14 cm. and 15.2 cm. meshes. In the past the departmental vessels fished in deeper waters with nets of 16.5 cm. and 17.8 cm. mesh. They gave a relatively higher yield. It has been decided to make a detailed study of the entire range i.e. from 7.6 cm. to 19 cm. and to ascertain the efficacy of each type. Similarly, the catching efficiency of various materials is also to be ascertained.

INDIAN OCEAN

Tuna fishing grounds around Madagascar and the Indian Ocean are being explored by the Japanese guidance ship *Taisei Maru*. The Mie Prefecture Fishery Experimental Station late in October 1960 received a report on the vessel's 11th trip as follows:

The first experimental operation was carried out south-southeast of Madagascar but failed to yield results. The second operation in the south-southwest sea area of the Island revealed that the water temperature was 17.7°C. (63.9°F.) in the 328-foot layer at 28° south latitude, 51° east longitude and condition of the layers seemed comparatively stabilized. As a result of 10 experimental operations, 1 south-southeast of Madagascar and 9 in the southwest sea area, catch ratios were found to be 5.74 percent and 9.35 percent respectively. In the southeast area 88

percent of the catch was albacore, 7.4 percent-yellowfin, and 4.6 percent bigeyed and mixed. In the southwest area species caught were numerous with yellowfin conspicuously more than others, followed by swordfish. The reason why yellowfin were found more was that the water temperature was 2°-4°C. higher than in the southeast area. Also, the branch stream running southward through the Mozambique Channel along the African coast had an effect on fishing in the southeast area and the fish caught were large-sized, comparatively speaking. More than 30 vessels were operating in the Madagascar Sea area in October 1960 with albacore as their objective generally. Fishing seemed better in the southern area. A considerable number of fishing vessels were operating north and in the central part south of the Mozambique Channel.

These fishing grounds were entirely undeveloped up to a year ago. In waters around the Chagos Islands, there were

some 10 vessels fishing for yellowfin and big-eyed, but fishing was only "fair" (*Fisheries Economic News*, 28 Oct. 1960).

FEDERATION OF MALAYA

The quarterly progress report for the First Quarter 1961 of Fisheries Department gives the following information:

Total fish-production in the first quarter of 1961 exceeded the landings of

both the last quarter and the first quarter of 1960. Production increases over the last quarter of 1960 were most significant in the states of Selangor and Perak, while on the East Coast, increase in landings was recorded only in Trengganu.

Mechanisation

	<u>1st Quarter 1961</u>	<u>4th Quarter 1960</u>	<u>1st Quarter 1960</u>
Inboards:	238	139	194
Outboards:	120	123	230

The rate of mechanisation increased in the first quarter of 1961 when 238 inboard-powered and 120 outboard-powered boats were registered as compared to 139 inboard – and 123 outboard-powered vessels in the last quarter of 1960. A more interesting feature of present trends in mechanisation is the increasing predominance of inboard Diesels over outboard engines i.e. 238 inboards to 120 outboards in the quarter under review as compared to 194 inboards to 130 outboards in the corresponding quarter of 1960. While fishing was successful over most of the country, progress in mechanisation was most rapid in Perak and Selangor. At the end of 1960 there were 4,009 inboard-powered and 5,469 outboard-powered boats in the country. The figures in the above Table for the first quarter of 1961, represent new registrations.

Developments in Gear Technology

With the introduction of synthetic pukat-jeroot bilis (Purse Seine) units in the North East region, heavy landings of ikan bilis (Anchovy) were recorded. Pressure stoves are now being used in Kuala

Trengganu for cooking this bilis more efficiently. More units of synthetic pukat-jeroot bilis also made their appearance on the East Coast during the quarter under review. The use of gasoline lamps for pukat tongkol and pukat dalam fishing is becoming more widespread in the North East. Pukat dalam fishermen are switching to coloured lighting (red) by hurricane lanterns as the bright light from the gasoline lamps is reported to cause shoals to disperse.

Co-operatives

The East Coast Co-operative and Marketing Union Ltd. marketed 3,926 piculs of fresh fish valued at M\$171,087 and 1090 piculs of cured fish valued at M\$20,935 during the quarter. The following were the more important commodities handled by the Union for sale to member societies at preferential rates:—Diesoline, Petrol, Cylinder Oil, Gear Oil, Kerosene, Grease, Ice, Salt, Life Jackets, Wire-netting, Rice. In the South East region a total of 174 drift-net pieces were distributed to member societies in

the Sungei Ular and Balok areas. This scheme of assistance was reported as working out successfully and fishermen were making regular repayments on their loans.

A move to form a co-operative society of fishermen in Kuala Perlis for the purpose of undertaking co-operative marketing was also reported. The society intends to apply for financial assistance at a later stage for the purchase of fishing equipment.

Marine Fisheries Schools

The first course for 1961 in Engine Care and Maintenance, Helmsmanship

and Fishing Methods is being held at the new Marine Fisheries School, Penang which was opened by His Excellency the Governor of Penang, Raja Tun Uda bin Raja Muhammad, on November 18th 1960. The course, lasting from January 9th to June 9th, is being attended by 29 trainees who are all housed and fed at the school hostel. The Marine Fisheries School at Sebrang Takir, Kuala Trengganu, completed at a cost of \$150,000, is to be opened on the 2nd May by His Highness the Sultan of Trengganu. The School will cater for fishermen trainees from the East Coast.

Freshwater Fisheries

The following numbers of fish-fry were distributed during the quarter to various areas in the Federation:—

	1st Quarter 1961	4th Quarter 1960	3rd Quarter 1960
Lampam Jawa	86,445	29,037	57,983
Lee Koh	35,352	19,996	13,575
Sepat Siam	—	—	5,037
Tilapia	14,750	20,746	22,155
Indian Carp	—	31,101	—
Kalui	515	70	10
Total	137,062	100,950	98,760

A further 90 ponds covering 42 acres were opened up for fish cultivation in the quarter under review, thus bringing up the acreage of fish-ponds in the country to 1321 acres. In addition, the Department treated some 49 mining pools with piscicide and stocked 33 ponds covering 364 acres with fry for public fishing. Land is being acquired in Central Pahang for a new Regional Fry Breeding Station costing \$86,000. This Station will provide fry for not only pond-culturists in the South-East region but also for stocking of disused waters in the area. The

Department is also investigating possibilities for developing fish-culture in a number of areas opened up by the Federal Land Development Authority. A survey of the waters in these places is being undertaken, and many areas, opened up for land development, can no doubt be profitably stocked with fry. Ten former trainees attended a fish-culture course in Penang. In addition, 22 trainees from the Agricultural Training Centre at Degong visited the Fry Breeding Station at Tapha to observe techniques of fish culture.

Research

Cockles: Investigations into growth and other aspects of cockle-culture were carried out on specimens obtained from the culture-beds at Jelutong, Penang. An analysis of the soil for determining carbon content and size of soil particles was also undertaken. Spatfall occurred at Kuala Jarum Mas, Panchor, in late January and local culturists were able to obtain good quality seed. Samples of plankton for routine study were also taken.

Rastrelliger Fishery: The purse seine fleets based at Pulau Pangkor had a poor fishing season and samples of fish for routine study were consequently limited. Work on the hydrology of the kembong fishing grounds to determine chemical and physical qualities of sea-water was continued in the quarter under review. Arrangements have been made with the Marine Department in Penang for samples of sea-water to be obtained by Marine Police Launches during their trips to Pulau Langkawi.

River Pollution in Johore: As a result of complaints of the Scudai River in Johore being polluted by discharge from pineapple canneries, the Research Officer (Technical) made a trip to investigate the problem. A chemical analysis of the discharge effluents was made and a report on the findings has been submitted.

Training Centre on Fish-Processing at Manila: The Research Officer (Technical) and the Fisheries Administrative

Officer, South East attended a six-weeks Training Centre on Fish Processing at Quezon City from 6th March-15th April.

Research, Fresh-water: With the increased landings of temoleh in January experiments were carried out to stimulate ovulation by pituitary injection into gravid females.

Shrimp Fishing Industry

The trade statistics of the Federation of Malaya do not list a classification for shrimp. Exports of shrimp, are included in the category of Crustacea. There have never been any exports of fresh or frozen shrimp from the Federation and only minimal quantities of salted shrimp. There are no vessels exclusively engaged in fishing for shrimp. Fishing is done on a cooperative basis by coastal village fishermen in small sail or motorboats. Most of the shrimp catch is made in Indonesian waters. Shrimp landings that are not consumed locally are salted and exported either to Singapore or Hong Kong. Shipments to Singapore are believed to be re-exported to the United States, and there is no likelihood of such exports in the near future. In 1959, exports from the Federation of "crustacea, salted, dried, or simply cooked" (believed to consist largely of shrimp) amounted to 292 tons valued at about US\$205,316; except for 3.6 tons shipped to Hong Kong, all was destined for Singapore. (*Comm. Fish. Rev.*, Jan. 1961).

PAKISTAN

Fishery Trends

Like those of India, waters off the coast of Pakistan are rich in fish and shellfish. Through aid from the U.S. International Cooperation Administration,

modern facilities for handling fish have been installed at Karachi harbor. These include docks, market place, refrigeration facilities, and an assembly room. Mackerel, pomfret, sole, shark and shrimp

occur in abundance. During the peak season 30,000 pounds of shrimp are processed daily, and 10,000 pounds are processed daily during the off-season. Some of the shrimp are exported to the U.S.A. Large quantities of salted shark are exported to Ceylon and Singapore. Aside from Karachi, the fishing industry is not well developed along the coast of West Pakistan. People in the northern portion of West Pakistan eat little fish due to the distance from the coast and lack of refrigeration facilities during transportation. The Biochemical Research Department of Pakistan's Central Laboratory at Karachi is working extensively on the extraction, analysis and processing of shark-liver oil for vitamin A. The oil

averages about 15,000 units per gram of vitamin A-nearly 25 times as much as standard cod-liver oil. Of the six species of shark obtained at Karachi, the hammerhead (*Sphyrna blochii*) is the richest source. Research is also in progress on the processing of fish flour from shark meat for human food.

Shrimp Exports

Frozen shrimp exports from East Pakistan to the U.S.A. were initiated in July 1960 with a sample consignment of five tons. The foundation stone of the Fisheries Technology Laboratory and the Fisheries Training Institute was laid at Chandpur (Comilla District), East Pakistan on 24 Feb. 1961 by the Government of East Pakistan.

THAILAND

Shrimp Industry

The inland, or fresh-water shrimp industry of Thailand consists mostly of fresh-water prawn; 90 percent is distributed either fresh or frozen, and the remaining 10 percent either salted or cooked. The principal inland shrimp fishing grounds are located in central Thailand. The most favorable season for catching fresh-water prawn is December-February, when the high tides of the river ebb. During this period, 8 to 15 tons of prawn are caught daily. The sea, or brackish-water, shrimp industry consists mainly of white shrimp. The small sizes are sold salted or cooked. Only a small amount of shrimp paste is produced because of the high manufacturing cost. The brackish-water shrimp industry is located at almost every major river delta along the Gulf of Thailand. Fishing is inactive during the monsoon season, July-September. The brackish-water shrimp grounds are also found along the coast,

but the most important area is on a line extending from Chumporn to the southernmost tip of Thai territorial waters. The Government-owned Cold Storage Organization in Bangkok is the only plant processing frozen shrimp. Washing, peeling and beheading is done by modern machines. New freezing plants for processing fish at Chumporn and Songkhla are planned. Facilities for processing shrimp will be incorporated. When completed, they should be able to take care of South Thailand's fish- and shrimp-processing requirements.

The total catch of shrimp for 1960 was estimated at not less than 2,000 metric tons, heads on weight. Unofficially, landings were 5,000 metric tons in 1956; 4,000 in 1957; 4,000 in 1958; and 3,000 in 1959. Fresh shrimp lose 42 percent of their weight when beheaded, and 60 percent when peeled. The two most commonly found species of shrimp are white shrimp and spotted shrimp.

There are approximately 200 fishing vessels of 20 gross tons each. Most are equipped with 60 h.p. engines. The export price of headless shrimp averaged about US\$1 a pound in 1958 and US\$0.85 in 1959. Most exports were to Malaya. Exports of frozen shrimp by the Cold Storage Organization averaged 100 metric tons in 1958 and 250 tons in 1959. The total value for the two years was about 1 million Baht (approximately US\$48,000). There were no exports in 1956 or in 1957. Some exports of frozen shrimp were made to Malaya, but none to the U.S.A. nor Europe during the first ten months of 1960. There is no subsidy, export duty, or export controls on shrimp. The types of shrimp

which are exported to all countries as well as the U.S.A. are known as white shrimp and spotted shrimp. However, according to marketing circles, white shrimp is preferred over spotted shrimp in the U.S.A. (*Comm. Fish. Rev.*, Feb. 1961).

Duty on fish meal

Fish meal is included in a list of 14 items on which duties have been lowered by Thailand in order to promote industrial and agricultural enterprises. Fish meal for animal consumption can now be imported into Thailand at a duty rate of 10 percent ad valorem as compared with the old rate of 27.5 percent. (*Foreign Commerce Weekly*, 14 Nov. 1960).

TAIWAN

Shrimp Industry

The major shrimp fishing grounds of Taiwan are off the coast of southwestern Taiwan from Yunlin to Kaohsiung, waters west of Penghu (Pescadores Islands), and the northern part of the Taiwan Strait. Shrimp are caught year-around, but the best season is March-May. During those months 50 percent of the annual catch is landed. All the shrimp landed in Taiwan are consumed locally. Large and medium shrimp are shipped with ice from producing centers to consuming centers such as Taipei, Taichung, Tainan, and Kaohsiung. They are used mostly by restaurants and hotels, as the price is too high for the average family. Small shrimp are consumed by both rural and urban families either fresh or dried. Dried shrimp are processed by boiling and then sun-drying. About 4-7 percent of the annual landings are dried. No frozen shrimp has been processed, although there are a few refrigeration plants with enough freezing capacity at Keelung and Kaohsiung. There has been no canning of shrimp. The

extent of mechanization in shrimp processing will depend largely on the prospect of export; there has been no discernible trend toward such mechanization. The production of shrimp (head-on) in Taiwan in recent years is as follows: estimated 6,000 metric tons for 1960; 5,111 tons for 1959; 4,059 tons for 1958; 3,892 tons for 1957; and 3,858 tons for 1956. Shrimp landings have increased rather sharply since 1958. Of the total production in 1959, 70 percent was caught by small trawlers in the inshore waters of the southwestern part of Taiwan, 10 percent was caught by various kinds of fishing methods such as swing-bell net or stick-held net along the coast, 15 percent was produced by culture in brackish-water fish ponds located in the southwestern part of Taiwan, and the remaining 5 percent was landed by deep-sea trawlers. There are more than a dozen species of shrimp produced in Taiwan. The major species are: red shrimp (*Penaeopsis acclivis*), thick-shell shrimp (*Penaeopsis akayehi*), sand shrimp (*Penaeopsis mono-*

ceros), striped shrimp (*Penaeus japonicus*), bright shrimp (*Pasiphaea sivado*), and grass shrimp (*Penaeus carinatus*). Shrimp are graded as large, medium and small. For large shrimp (mostly striped shrimp and grass shrimp), there are fewer than 20 heads-on shrimp per pound. Medium shrimp (mostly thick-shell shrimp, red shrimp, and sand shrimp) run between 30 and 40 per pound. Small shrimp (various species) run more than 40 per pound. Of the total shrimp production (head-on), large shrimp account for about 10%, medium shrimp 40%, and small shrimp 50%.

There are about 900 shrimp trawlers of 5-10 tons, with 22-30 hp. engines, operating in the waters of Taiwan. Most of these vessels make one-day trips, but a few make seven day trips to the inshore

waters of Penghu. There is no overall planning for vessel construction nor for expansion of the present fleet.

Exporters in Taiwan have studied the possibilities of exporting frozen shrimp to the U.S.A., but the high prices on the local market is the major deterrent to such attempts. The current wholesale price of large shrimp is about NT\$60-80 per kilogram (68-90 U.S. cents a pound), which is higher than the market price in the U.S.A.

According to fishery specialists of the Sino-American Joint Commission on Rural Reconstruction (JCRR), the *production of medium and small shrimp could be increased substantially from waters around Taiwan, were the demand to rise.* (*Comm. Fish. Rev.*, Feb. 1961).

U.S.A.

The *press release* of 21 April 1961 of the U.S. Fish & Wildlife Service Regional Information, Honolulu, Hawaii gives the following information: The threadfin shad, *Dorosoma patenense*, was introduced to Hawaii by the U.S. Bureau of Commercial Fisheries Biological Laboratory, Honolulu, and the Hawaii State Division of Fish and Game as a possible supplementary live bait for aku and as feed for some of the freshwater game fishes. This shad has been used extensively in lakes and rivers of the continental U.S.A. as a forage fish. Its prolific spawning habits and relatively small size (maximum length about 7 in or 17.8 c.m.) make it ideal for this purpose. It naturally feeds on water weeds and microscopic plants and animals and it has been kept successfully as commercial trout food in captivity. The first large-scale introduction to Hawaii was made in August 1959, when an estimated 4,000 shad arrived aboard a freight

ter in a specially made fish tank. These shad had been gradually shifted from fresh to sea water before the voyage from California and were shifted back to fresh water after their arrival in the islands. The change from fresh to sea water and back was made very gradually over a period of 3 days to avoid killing the fish. Besides those that were released in reservoirs and rivers, well over 1,000 shad were kept in outdoor and indoor tanks at the U.S. Bureau of Commercial Fisheries Biological Laboratory, Honolulu, for observation. The shad has spawned successfully in Wahiawa Reservoir, Nuuanu Reservoir and in Maui Reservoir. There have been no signs of spawning in the Anahulu River, Wailua River, nor in the tanks at the U.S. Bureau of Commercial Fisheries Biological Laboratory, Honolulu. Sea tests aboard an aku sampan using shad as live bait were made in 1958 by the Hawaiian Tuna Packers and the U.S.

Bureau of Commercial Fisheries Biological Laboratory, Honolulu. The results were very encouraging in that they showed that the aku readily accepted shad as food, and the rate at which aku were caught with shad was better than with nehu during the test. However, this was not conclusive since only a few buckets of shad were available for the tests. Further studies will have to be made before one can tell whether shad will be a good supplementary live bait for aku.

The *News Notes* on scientific activities of the Honolulu Biological Laboratory for April 1961 gives the following information:

On the basis of tag recovery data, age and growth information, and distribution and size frequency data from the various fisheries, a model of the migration of albacore in the North Pacific Ocean has been developed. This model, consistent with the hypothesis that there is a single population of albacore in the North Pacific Ocean, is: A varying portion of the 2-, 3- and 4-year old fish and nearly all of the older fish in the American fishery migrate westward each fall into the Japanese longline fishery, and, during the following spring, into the Japanese live-bait fishery. The remainder of the fish from the area of the American fishery move westward to the mid-ocean waters of the North Pacific, some as far west as the fringe of the Japanese longline fishing grounds. Those fish that do not move into the Japanese live-bait fishery return to the American fishery the following season. Thus, some fish may be available to the American fishery for as many as four or five successive seasons. Albacore enter the Japanese winter longline fishery from both the American fishery (westerly migration in the fall) and the Japanese live-bait fishery (easterly migration in

late summer). Each spring, a large portion of these fish, age groups 2 through 5 years, migrate westerly from the longline fishery grounds into the live-bait fishery, while a few separate and move eastward into the American fishery. The larger adults (6-years or older) move southward from the winter longline fishery into the tropical and subtropical waters to the spawning grounds of the North Pacific albacore population. It appears that the major portion of the recruitment into the exploited stock (recruitment begins at age 2 and is completed at age 3) takes place in the eastern rather than the western North Pacific. There is a greater volume of migration of the commercial sizes of albacore in a westerly direction from the American fishery into the Japanese fisheries, than vice versa.

The *press release* dated 19 May 1961 of the U.S. Fish and Wildlife Service Regional Information, Honolulu, Hawaii gives the following information on experimental skipjack fishing with new type of net.

Fishery biologists and fishermen of the Bureau of Commercial Fisheries Biological Laboratory, Honolulu, were encouraged by the results of three test operations carried out May 13-16 off Lansi and Haianae, Oahu, in which a gill-net of monofilament line was used to catch aku (skipjack tuna). The monofilament net, made of a clear, transparent synthetic fiber similar in appearance to the nylon leaders used by sport fishermen, was fished from the research vessel CHARLES H. GILBERT along with an equal length of net made from conventional green-dyed nylon twine. Of the total of 326 skipjack caught in the nets, all but 5 were in the monofilament portion. According to the scientist in charge of the gill-net experiments, the difference in visibility of

the two kinds of net, as viewed from the underwater observation chambers of the CHARLES H. GILBERT, was very striking, the nylon net standing out conspicuously in the clear water, while the monofilament net was almost invisible to the human eye. The strategy employed in the tests was to slow down the movements of a school of aku by chumming with live bait, set the net close to the school, and then throw additional live bait to induce a "feeding frenzy" that would overcome the skipjack's usual caution. It appeared to the observers that those aku which were not in such a state of frenzied excitement were to some extent aware of even the transparent monofilament net. The gill-net, which was 200 fathoms (about 1,200 feet) long and 4 fathoms (24 feet) deep, could be hauled aboard the vessel in about 20 minutes by means of a hydraulic-powered device called a Power-Block, and the 3-5 pound skipjack passed through the block along with the net without being seriously damaged. The skipjack net fishing experiments are aimed at

finding a method to enable Hawaii's sampan fleet to harvest aku more efficiently and economically and thus to meet the competition of better equipped fishermen in other areas. The development program is only in the preliminary stage, and the few trials reported above were made with a small net improvised from materials on hand. The results are, however, considered encouraging for they indicate that aku can be taken in monofilament gill-nets in numbers large enough to make further experimentation possible and worthwhile. The Laboratory plans to construct a longer, deeper net entirely of monofilament web, using funds made available especially for this purpose by the Department of the Interior. If proposed State financial support, presently pending in the Legislature, is forthcoming, this net will be thoroughly tested aboard a sampan of the aku fleet, under the actual conditions which the method will have to meet in order to be of help to the Hawaiian tuna industry.

FAO ACTIVITIES

Staff Movements

Dr. H.H. Brown, Field Liaison Officer, Fisheries Division has been appointed Programming and Operations Officer, Fisheries Division, in charge of the Program Coordination Office.

Technical Assistance

Mr. M. Poliakov, Master Fisherman, (U.S.S.R.) is on his way back to India after one month's leave in Russia. Mr. Poliakov will remain at Rome for approximately one week for briefing and technical discussions. Mr. Poliakov has just completed a one-year FAO/TA assignment at Visakhapatnam, India, where he will

be returning for a further period of one year. His terms of reference are: to operate the Government trawlers and carry out experimental and exploratory deepsea fishing (trawling) in the Bay of Bengal.

Mr. Joseph Gilles (France) is proceeding to Saigon, Vietnam, for six months to organize a Fishermen's Training Centre on a permanent basis to be continued later by Government personnel. Mr. Pierre Lasyné of the Fishing Gear Section will accompany Mr. Gilles to Saigon and remain there with him for approximately one month.

Mr. John W. Parsons, Chief of the Lake Erie Fishery Investigations for the U.S. Bureau of Commercial Fisheries, is beginning a year's assignment as an FAO fishery expert in the Philippines. Mr. Parsons, a limnologist, will assist the Philippine Government in organizing the work for a limnological laboratory which is under construction. He will also conduct fishery and limnological investigations of inland Philippine waters. Limnology is the study of the physical, chemical and biological conditions of fresh waters. The American fisheries expert has been doing research on the interrelationship of fish populations, habitat and on commercial fishing in the

Great Lakes area. He has planned fishery research in seven large reservoirs and has conducted research on 15 large reservoirs in the southeastern U.S. Mr. Parsons is the author of "Fishery Management Problems and Responsibilities in Large Southeastern Reservoirs" and "Fish Species Composition and Physical Characteristics of a Large Reservoir in Tennessee." He previously has been a biological aide for the Iowa Conservation Commission, district biologist for the Tennessee Game and Fish Commission and Chief of Special Investigations for the U.S. Bureau of Sports Fish and Wildlife Services branch at Atlanta, Ga.

IPFC AFFAIRS

Personnel

Mr. Tubb visited the Central Inland Fisheries Research Station at Barrackpore, India, places of fisheries development interest in Nepal and had talks with government officials in Rangoon during April and early May.

The program of work of the Barrackpore Station is of considerable interest as particular attention is being paid to the effect of the marked changes in water regime in the Hooghly River on the more important commercial species of fish. Particular attention is being given to *Hilsa*, Bombay Duck (*Harpodon nehereus*) and *Lates calcarifer*. In addition to the intensive statistical study, the biology of these and other species is under examination and the ensuing few years should show some interesting results, particularly whether the occurrences and proportions of these species are inter-related. In Nepal, interesting talks were held with the officials of the Department of Agriculture and visits

were made to fish culture stations and potential fisheries development areas, particularly in Kathmandu, Pokhara and Purwanipur. With a very small staff, the Fisheries Development Branch of the Department of Agriculture is making rapid progress in fish culture, paying particular attention to the propagation and distribution of mirror carp, while at the same time experiments to determine the suitability of locally available species for pond culture are being planned. In Rangoon it was learnt that a Directorate of Fisheries associated with the Department of Agriculture will probably be established in August 1961. This Directorate will take over the present program of work of the Fisheries Division of the Agricultural and Rural Development Corporation and it is anticipated that, as the availability of staff and facilities increases, this program will be considerably expanded to cover fresh, brackish and marine fisheries with considerable emphasis on the use of major carp for pond culture.

Dr. G.N. Subba Rao took part as a lecturer at the FAO/IPFC Fish Processing Training Center, Quezon City, Philippines during the latter part of March and April. He also visited Cambodia during the second and third weeks of May to review fishery developments and took part in the aerial survey of the Great Lake and the associated river systems and in the discussions concerning the fisheries aspects of the proposed dam across the Tonlé Sap.

Fish Processing Training Center

The FAO Fish Processing Training Center took place during 6 March-15 April at the Quezon City, Philippines. The Center was attended by fisheries officers from Australia, India, Indonesia, Japan, Korea, Federation of Malaya, Pakistan, Philippines, Thailand, and Vietnam. There were altogether 24 participants including seven from the host country. Of these, one was a specialist in fishing, seventeen were fish processing technologists engaged in research or technical advice to industry, two were from fisheries administration, and four were instructors in fisheries educational institutions. The following member countries of the IPFC did not participate: Burma, Cambodia, Ceylon, France, Netherlands, U.K. and U.S.A. The host Government provided the Director of the Training Center (Mr. J.R. Montilla, Director, Bureau of Fisheries), and in addition the following part-time lecturers: Prof. M. Zabat, Professor of Sanitary Engineering, Institute of Hygiene; Mr. N.A. Pidlaoan, Director, College of Fisheries; Mr. S.V. Bersamin, Chief, Fisheries Technological Section, Bureau of Fisheries; Mrs. L.

Pesigan, Chief of Food and Drug Inspection Service, Department of Health; Dr. P.R. Aragon, Chief of Bacteriology Laboratory, Institute of Hygiene. Two full time lecturers, Dr. C.L. Cutting, Officer-in-Charge, Humber Laboratory, Hull, U.K. and Dr. K. Amano, Chief Biochemist, Tokai Regional Research Laboratory, Tokyo, Japan, were provided by FAO, in addition to the Associate Director (Dr. Kreuzer, Chief of FAO Fish Processing Section, Rome) and the part-time lecturer (Dr. G.N. Subba Rao, FAO Fisheries Officer, Bangkok). In addition, there were two guest lectures: Dr. A. Tallboys, Sanitary Engineer (U.S.A.) and Mr. J. Blaeske, Sanitarian, WHO.

A wide range of subjects was covered by the Training Center which included the fundamental and practical aspects of traditional and new fish processing methods, sanitation of plants, quality control, and nutrition. The actual course of training included lectures, discussions, laboratory practical work, demonstrations, and visits to industrial establishments. Participants from each country were required to present papers on the status of the fish processing industry in their respective countries and these papers were discussed in the various discussion groups.

Among the equipment used for practical work and demonstrations were: Torry mechanical fish drying and smoking kiln, fish sausage making equipment from Japan, and portable thermometer for measuring temperatures of fish. During the holidays, a number of visits to places of interest in the Luzon Island such as Los Banos, Baguio, Hundred Islands, were arranged by the Philippine Government.

PERSONALIA

Mr. Boon Indrambarya, formerly Director-General, Department of Fisheries, Thailand, has relinquished his post to take up full time duties as Dean of the Faculty of Fisheries, Kasetsart Agricultural University, Bangkok, Thailand.

Mr. Boon took over his new academic responsibilities in July 1961 and **Mr. Prida Karnasut**, formerly Head of the Inland Fisheries Division, was appointed Acting Director-General.

In August 1961 Mr. Prida was designated substantive Director-General of

Fisheries for Thailand.

Arising from this change in personnel the Government of Thailand have made the following changes in official appointment to the IPFC:

Mr. Prida Karnasut has been designated IPFC Administrative Correspondent, the post occupied for many years by Mr. Boon and **Mr. Chertchai Amatayakul** who has replaced Mr. Prida as Head, Division of Inland Fisheries, has been designated as Thai member of the IPFC Technical Committee I.

CURRENT READING

Report for 1959-1960, Tropical Fish Culture Research Institute, Malacca:

This Report for the year ended 31 August 1960, has the following contents: Members of staff: General Organization; Maintenance; Research Program. The highlights of the research program include production of *Tilapia mossambica* hybrids, breeding of Chinese grass carp (*Ctenopharyngodon idellus*) and Catla (*Catla catla*), genetics of various species of *Tilapia*, trials with fertilizers, living space experiments (density of stocking), botanical, zoological, and chemical studies. Experiments with *Tilapia* hybrids have shown that only male hybrids are produced from Zanzibar male X Malayan female, no female fry being observed at all. Studies on grass carp have shown that the fish if left undisturbed, but well-fed can reach sexual maturity, and inability to reach maturity under certain conditions is due to a stress reaction. Acclimatization to the stress takes place automatically in time though subjection of the fish to flowing water may speed up

the acclimatization. The actual spawning of grass carp appears to be controlled, in the female at least, by some physiological mechanism other than that which brings about the maturation of the oocytes. The activation of this mechanism may at least be partly dependent on a fast flow, such as occurs in the natural spawning grounds in China. Preliminary studies on fertilization of ponds with artificial fertilizers indicate that phosphate increases the yield of *Tilapia mossambica*, grass carp and *Puntius javanicus*.

Report of the Fisheries Division, 1959, Ministry of National Development, Singapore

This Report gives the following general review of the industry: The bulk of the Singapore fishermen fish in the limited fishing grounds of Singapore and these grounds are being operated at the maximum level of intensity. Those using large fishing vessels powered by inboard engines operate in the South China Sea and the fringes of the Indian Ocean. In the offshore areas only the bottom fishery

resources and those types of surface fish, such as tuna which can be caught by trolllines, are exploited. Surface aggregations of fish which are sufficiently large and regular for commercial exploitation have not been found. There is also a certain traditional reluctance among local fishermen to venture out into the offshore areas as such fishing trips entail an absence of up to two weeks from port at one time. Only research on an extensive scale can reveal whether or not there are sufficient stocks in the mid-water layers for commercial exploitation.

Meanwhile certain local fishing companies have concluded agreements with foreign fishing companies to enlist their assistance in tapping the offshore bottom resources by means of trawlers. Other companies have made agreements with fishery co-operatives in other neighbouring countries whereby they either buy the fish caught by these co-operatives or teach them how to catch the fish and thereby get a share of the catch. These agreements serve the purpose of keeping the fishermen in full employment. The demand for fish in Singapore in 1959 remained high. Local production of the types favoured by the consumer was insufficient to meet this demand and had to be supplemented by imports from the Federation of Malaya. A total of about 41,000 tons of fresh fish was landed in 1959. The total number of fishermen engaged in the industry in 1959 showed a very slight decrease. The number of licensed fishing boats decreased by 142 from the total for 1958. This figure was due to a decrease of 155 non-powered vessels and six inboard engined vessels which was offset by an increase of 19 outboard engined vessels. There has been no change in the system of marketing of

fish. As in the past fresh fish is landed at various points on the island and auctioned at two City Council and three private wholesale markets. Auctions are conducted by wholesale agents who receive a commission from the fishermen and fish importers. In the case of the City Council Markets a commission equal to five per cent of the auction value of the fish is paid to the City Council and an equivalent is collected by the fish auctioneers for services. In the case of the private markets the owners charge a commission equivalent to between five per cent and seven and a half per cent of the auction value of the fish.

The brackish water prawn ponds at the Fisheries Experimental Station at West Coast Road continued operations until 31st May 1959, by which time sufficient data on production had been obtained.

All loans issued from the Fisheries Loans Fund have been paid up in 1956 and no loan was issued in 1957, 1958 and 1959. Assistance to fishermen for the purchase of fishing materials at wholesale prices was maintained through the Fishing Materials Purchase Account. The demand declined during the last five years as the supply position had returned to normal and fishermen were getting their supplies through normal trade channels.

The Fisheries Mobile Unit continued its instruction and demonstration programme. 286 visits were made to fishing villages during the year under review. Demonstrations and repairs were carried out on 127 engines. The number of fishing days was increased as a result of more efficient maintenance of the fishing boat engines. This service proved to be very popular with the drift-net fishermen. The production from drift-net fishermen using

these engines increased from about 1,400 tons in 1958 to about 1,750 tons in 1959.

The Apprenticeship Training Scheme for trawler hands formulated under the Joint Advisory Council for Apprenticeship Training of the Labour Ministry was implemented at the beginning of the year. Under this scheme the apprentices are required to work in trawlers at sea for a period of two years before being taken on as trawler hands. Each apprentice is paid M\$60 per month during the first year of apprenticeship and M\$80 per month during the second year of apprenticeship. Food is provided when the trawlers are fishing at sea. An apprentice is permitted to accompany a trawler on two fishing trips in order to enable him to decide whether he can adjust himself to the way of life of a deep-sea fisherman. Before leaving port on board a trawler for his third trip, the apprentice has to sign an Apprenticeship Agreement (Fishing Industry).

The Pilot Fisheries Training School which was started at Tanjong Kling towards the end of 1958 was continued in 1959. The course started with 43 students and ended with 20 students, as 23 students left the course during the year. They were taught the construction and use of different types of fishing gears, such as *Pelontang* (floated line), *Rawei Umpan* (long-line), *Bubus* (fish pots) and *Jaring* (drift nets). They also received instruction in elementary hydrology, preservation and storage of fish, engine maintenance and repair, fish canning and construction of *kolehs*. A total of 29 outboard engines were repaired by the students. The results of this pilot training scheme were gratifying, particularly as the students had shown considerable keenness. In fact, they built the training

centre themselves with materials supplied by Government. They are now an asset to the village in that they are now self-employed fishermen and assist other fishermen in engine repairs.

This review is followed by a number of tables which give statistical data on the fishermen, fishing boats, gear, fish production, and trade.

Meyer Waarden, P.F., Egon and Inge Halsband. *Bibliographie über die Elektro-fischerei und ihre Grundlagen (Bibliography on the Electrofishing and its basis).* *Archiv für Fischereiwissenschaft, Vol. II, No. 1, 1960, 104 pp., in German.*

This publication contains some 600 references with abstracts in German on the use of electricity in the fishing industry, including fish catching, fisheries management, fish wiers, screens, and other means of diversion, fish preservation, fish culture, etc.

Atlantic Ocean Fisheries: edited by G. Borgstrom and A.J. Heighway. Publ. by Fishing News (Books) Ltd., Ludgate House, 110 Fleet Street, London, E.C.4. 1961: viii + 336, illustr. Price St. 3-7-6.

This book, *Atlantic Ocean Fisheries*, reveals the leviathan labour involved in taking apart scientifically that amazing reservoir of fish which constitutes the Atlantic Ocean, North and South.

All aspects of its teeming submarine world from the extremities of South America and South Africa to the Arctic Circle are studied by experts. Their facts and comments are of supreme interest and importance to all who are concerned in any way with seeing that vast and multiplying populations get the protein they need.

From this colossal storehouse of serious knowledge amassed by scientists,

technologists, engineers and technicians, the inquiring statesman, administrator, fisherman, processor, wholesaler, retailer and man-in-the-street can draw vital guidance, with, underlying it, much cogent counsel for the steady further development of international co-operation, to conserve stocks and maintain supplies for the future.

The book reports the mammoth effort of the Soviet Union in reconnaissance and exploration. In fact, the third section of this volume is almost a book in itself in its revelations, for the first time ever, of the activities of more than 9,000 fishery scientists and technologists whom Russia has recruited and trained in her gigantic drive to discover more fish and to perfect new methods of processing them to attract the consumer. In etching this outsize canvas, Dr. Ovchynnyk and Dr. Borgstrom have not only produced a detailed and invaluable picture of one of the fishing world's most intensive enterprises, but have also revealed trends for the future, which have portents for others. *Inter alia*, they tell of the unique "communes" in which thousands of workers are processing and distributing fish; the pattern of ultra-modern tactics of factory ships and attendant trawlers; of experimentation in inland fisheries; and the growth of the world's largest fishing port.

Two of the other three sections of the book scrutinize broadly the geographical and industrial panorama of the Atlantic. In his oceanographical analysis of its vital statistics and physical features, Dr. Carruthers introduces a touch as fascinating to the layman as it is informative to the professional. The heterogeneous seascape is enlarged under the biological brush of Dr. Taivo Laevastu who paints in the background for assessing yields. Mr. Basil Engholm, England and

Wales Fisheries Secretary, gives an historical outline of the course that has evolved and must continue if international accord on fisheries is to be achieved. The legal aspects of fishing limits occupy solicitor Mr. George Winder, while developments in ships and gear are described by Commanders A. C. Hardy and John Burgess.

The industrial section contains 22 chapters from the pens of experts on Norway, Sweden, Poland, West Germany, Denmark (Greenland and Faroe), the Netherlands, Great Britain, Belgium, France, Spain, Portugal, Italy, Angola and Morocco, South Africa, Patagonia, Argentina, Brazil, the Caribbean, Mexico, the United States, Canada and Iceland. Ideas and practices from all countries in catching, marketing and processing are meticulously charted. Many of these chapters are outstandingly valuable — particularly those on U.S.A., U.K., Norway, Poland and Denmark — because of special points brought out.

The final section lists the scientific and common names of some 500 species of fish, contains a glossary of relevant terms and a summary of the vital recommendations and implications of the British Committee of Inquiry into the Fishing Industry.

All this adds up to over 300,000 words of indispensable knowledge of Atlantic Ocean Fisheries. The book is prolifically illustrated with nearly 60 photographs and has a plethora of tables, charts and maps.

R. Vibert et K.F. Lagler — *Pêches Continentales, Biologie et Aménagement*. publ. by Dunod, Editeur, 92 Rue Bonaparte, Paris-6^e, 1961 XXIV + 720 pages, 164 figures, Price — 88 N.F.

This work attempts a synthesis of

today's knowledge in the field of biology and the management of inland waters, which from the dynamic point of view, can be considered as complexes, called "ecosystems" by the ecologists and which can be compared to living super-organisms. In such a "super-organism", fishing can be tolerable just as blood-letting is to an animal. The losses are, in such case, rapidly compensated for, in an animal, by the organs generating the blood elements having a sufficient excess productive potential and in the "super-organism", by spawners which equally have, under normal circumstances, a surplus reproductive capacity. On the other hand, if the fish catch or other accidental losses exceed the reserved reproductive capacity called "resilience", the "super-organism" becomes anaemic and requires a more or less complete rest (fishing restriction) or even a blood transfusion (re-stocking).

Fisheries biology studies the general physiology of the "super-organism", which can be compared to a fishing ground, particularly with regard to "blood-letting" by fishing, while fisheries management includes all treatments which could be applied to the "super-organism", in order to bring it to that state which allows it to bear in a sustained manner man's "blood-letting" (fishing) which must be in the best possible proportion, with regard to both quantity and quality.

The first part of the work deals with the ecological bases of inland fisheries biology and management, the concepts and principles relating to energy in the ecosystem - Heredity - Environment - Social Organization - Evolution of ecosystems (ecological successions) - Fisheries Mathematical Theories. Special attention should be given to the statement on the mathematical theory of fisheries which permits the symbolic representation of

the complex system constituting a fishing ground of a specific type. However, the authors warn of the dangers of a too hurried generalization of this theory which as yet can solve only simple problems.

The second part of the work is devoted to the study of the principles of management. Management of the environment consists of all that could be considered as interventions in the habitat as well as in the community formed by all the vegetable and animal species represented (including the selected fish species) for the purpose of increasing what the authors call the specific "ichthyabilité" of a given fishing ground. Interventions in the habitat are mainly related to the condition of the watersheds, with control of pollution and soil conservation, to the unrestricted migration of fish, to shelters, useful or bad, for the selected species, to food, to the control of overabundant species, and to diseases. In the management of the selected species, there are 3 possibilities for intervention: population control to avoid too rapid multiplication leading to a low rate of growth, the protection of fish liable to destruction due to changes in the habitat, and, finally, replenishment of the population with selected stock.

Management of exploitation consists mainly in the control of fishing intensity through regulations. For centuries, at least in Europe, there have been preconceived ideas of chronic overfishing of rivers and lakes, and of the essential benefits of all conservational measures. It has been recently observed that, if overfishing was indeed harmful to populations of weak resilience (Salmonidae), nevertheless underfishing was also harmful to these species of strong resilience which predominate in the warm and

temperate waters. The study of management principles ends with a chapter on Information. Natural exploitation of inland waters can be undertaken with but a minimum understanding on the part of the public. Consequently, it is through the quality and effectiveness of information services that the administrative officer will lead toward the better management of the fishing grounds for which he is responsible. He will have to act with a view both to the appropriate training of scientists and technicians, and, to education of the public.

The third part of the work deals with the manner in which management principles are or should be put into practice in different categories of inland waters which are classified as natural waters, semi-domestic waters, domestic waters and waters of hybrid character. The development of semi-domestic waters in which the environment is only a cage and no longer an ecosystem, is merely referred to, for it forms the subject of many treatises on fishculture, and includes freshwater and brackishwater ponds as well as rice fields. Brief reference is made to the different practices existing in the main pond regions of Asia, Europe, the United States and Africa.

Natural waters, the more or less extensive exploitation of which depends on fishing proper, include lakes and rivers. Except for some essentially simple situations, scientific knowledge is still insufficient to provide definite answers to the problems or to lead to an unquestionable diagnosis; the known methods of intervention are still too crude to permit all the desired effects. In the management of these waters, the personal judgement of the specialist, based of course on as much information as possible, plays a very important part. Waters of hybrid charac-

ter include coastal brackish-water lagoons and ponds, fishponds constructed in the rivers and the flood zones. The methods of management of Egypt's coastal ponds, of the ponds of the French coast of Landes and the "vallis" of the Italian Adriatic coast, are briefly dealt with.

In the fourth and last part, the authors have summarized, in the form of a manual, the essential information on statistical analysis, marking, methods of studying the age and growth, food diet and feeding habits, survey of populations and catch statistics, and ecological diagnosis. This summary, will undoubtedly be of considerable benefit to students, biologists and fisheries managers.

The book contains more than 1,200 bibliographical references, classified by chapter, and the excellence of its presentation reflects considerable credit on the editor.

This publication will be particularly useful to research workers and technicians in tropical regions where production from inland waters offers greater possibilities but where, also, the necessary knowledge for the rational exploitation of these waters is still particularly limited.

Michel Angot: *Vie et Economie des Mers Tropicales*. publ. by Payot, 106 Boulevard Saint-Germain, Paris, 1961 : 326, 27 figs, 16 photoes. Price: NF 22.00.

The living world of the tropical seas has for long engaged the attention of scientists. Naturalists, biologists, physiologists, ethnologists and others have found in it a rich field for research. Only recently have these seas attracted the interest of the economist, who now recognizes that, in the fabulous wealth of these vast areas may be found a weapon for use in the struggle against present hunger and a source of nourishment for

the increasing millions of people which demographic studies indicate will be born in the future. The present volume covers a much wider wider field than M. Angot's specialization, physical oceanography. As Professor M. Fontaine, Director of the Institute of Oceanography, writes, in his preface "il est heureux que la paternité de cet ouvrage soit assurée par Michel Angot, car celui-ci s'attaque à cette question si complexe avec le courage et l'enthousiasme d'un homme jeune et convaincu, ardent à ce travail d'océanographie, qu'il a embrassé comme une vocation, avec aussi la haute compétence d'un savant qui possède une exceptionnelle connaissance des aspects très variés de la vie tropicale et de l'exploitation de ses richesses".

After defining "tropical seas", primarily on a basis of the 20°C isotherm, the author describes the various zones

and their biological characteristics. M. Angot reviews the traditional fishery methods of the region, with particular reference to those of Madagascar, suggests means for the rational exploitation of tropical seas, briefly describes the historical development of the fisheries, and outlines the growing role of science in guiding and controlling those fishery enterprises which already have attained the status of an industry. A selected bibliography of 61 titles is given.

M. Angot's contribution to an understanding of the problems of development and utilization of this immense and productive region of the world's surface will be of deep interest not only to scientists and economists but also to all those interested in or directly concerned with the great problems of world economy and the utilization of natural resources.

MEETINGS AND CONFERENCES

International Fish Meal Meeting

The tumbling price of fish meal and the effect it has had on the incomes of fishermen and producers drew the acceptance of 23 countries to invitations to the first international meeting on fish meal, held from 20-29 March at Rome, Headquarters of FAO. The governments of Argentina, Belgium, Canada, Chile, Denmark, France, Germany, Iceland, Senegal, Spain, Sweden, Switzerland, the Union of South Africa, the United Kingdom, the United States of America and Yugoslavia participated. The meeting, convened by FAO at the request of governments and with the financial backing of the fish-meal industry, considered practical steps towards increasing effective demand for fish meal and ensuring stable conditions in the market. Papers on the position of their fish-meal

industry and trade were sent to FAO for discussion at the meeting by Austria, Belgium, Canada, Colombia, Finland, Ghana, Israel, Japan, Nicaragua, Panama, Pakistan, Peru, the U.K., the U.S. and the Union of South Africa.

Conditions leading to the current position of the fish-meal market are described by Mr. Peter Petersen, an FAO fish-meal marketing expert and president of a Norwegian fish-meal manufacturing firm, in a background paper on "Fish Meal Production and Trade in the World", prepared for the meeting. A latent demand for fish meal, which is used primarily for poultry and swine feeding, was created during 1956-58, due to a sharp reduction in the Norwegian winter herring catch. Concern arose among buyers over continued supplies, driving the price of fish meal upwards

to levels considerably out of line with those of other feedstuffs. The high prices led to intensified research to find substitutes for fish meal, and to intensified expansion of production. Surpluses were created, production had to be reduced and the price of fish meal fell from about \$130 to \$75 a ton. A rise in fish-meal production is seen by Mr. Petersen regardless of the current low prices. Peru, which went from a fish-meal production of only 16,500 metric tons in 1954, to a production of one-quarter of the world's fish meal last year, promised to hit the 620,000-metric-ton mark this year with the aid of new fishing vessels and fish-meal plants plus additional plants and fishing vessels.

Even a continuation of the present low prices for fish meal for the next few years, would not materially reduce the total quantity of fish meal produced outside of Chile and Peru below 1960 levels. Some countries, notably the Netherlands, the Federal Republic of Germany and the United Kingdom, appear temporarily to be nearing a saturation point. Other countries represent big potential markets, since they are in a position to add to what they are using today. Peru, Chile and the Union of South Africa are today – and will be in years to come – the low-cost producers of fish meal in the world. They will between themselves probably account for 70 to 80 percent of fish-meal exports. It is possible that Angola, British Columbia (Canada), Denmark and Japan, all hit by bad catches or turmoil in the industry, may again regain previous levels of production, which would more than compensate for a decrease in production elsewhere. Norway may again increase her production in 1963/64, when she expects increased winter herring catches. However, the report points out that stocks of fish meal

on producers' hands in 1960 had been decreased by some 80,000 to 90,000 tons. The relatively heavy stocks of domestic meal in the United States were down considerably as compared with last year.

A potential market which in the long run could make large inroads into accumulating fish-meal stocks could be the refining of fish meal into fish flour for human consumption in those areas of the world suffering from protein malnutrition. A background paper by Dr. G.F. Combs, professor of nutrition, University of Maryland, and an FAO consultant on fish-meal utilization, describes fish flour as probably representing the greatest market potential for industrial fish. Industrial fish is fish caught in conjunction with fish for human consumption.

The role in which such a product could contribute to better nutrition, particularly of children throughout many areas of the world, is most impressive, says Dr. Combs in his report. Problems do exist, however, in manufacturing, distributing and insuring consumption of fish flour in under-developed countries most seriously in need of good-quality protein. A constant-quality fish flour is not commercially available as yet at a favorable price, even though several processes have been used. Additional chemical engineering studies are needed before any widespread use of fish flour may be expected. However, the amount of fish flour which could be made available rapidly is great in relation to other sources of high-quality protein.

A background paper on edible fish flour prepared by the Nutrition Division of FAO for the meeting points out that to date some 30 preliminary and 20 large-scale acceptability fish flour trials have been made. Non-deodorized fish flour had been successfully marketed in the former

Belgian Congo and Ghana, first at a reduced price and later at a commercial price. A process for partly-deodorized edible fish flour has been developed in Morocco and a promotion campaign sponsored jointly by the Moroccan government, FAO and the UNICEF was now in full operation. The report says that although a number of fish flours had been tested for suitability as an ingredient of the human diet under the auspices of the United Nations agencies, private enterprise, with a few exceptions, has shown relatively little interest and inclination to invest funds in research, development, quality control and marketing of cheap, acceptable and nutritional fish flours. If these developments are to be accelerated it is hoped that private enterprise will be involved to a greater extent in product development, and especially in promotion through advertising and commercial channels.

The meeting recommended that uniform supply of fish meal throughout the year should be ensured, particularly at prices comparable with other high protein feeds. Further studies should be made to increase the consumption of fish concentrates as animal feedstuffs and as fish flour by human beings.

FAO Meeting on Effects of Fishing Rules

The economic effects of fishery regulations, a field of study that is rapidly gaining international importance with the increasing size and range of fishing fleets and with the extensive exploitation of the high seas, will be further evaluated at a meeting of experts from 12-17 June at Ottawa, Canada. Sponsored by the FAO, the meeting is the result of four conferences, beginning in 1956, on the economic effects of regulations in selected fisheries.

FAO member governments and interested intergovernmental organizations have been invited to send participants with expert knowledge in this field. The purpose of the meeting, is to add to the theoretical knowledge of the economic management of fisheries and to improved the value of regulation as a means towards attaining basic objectives of fishery policy. Until recently, attention was focussed primarily on regulating fishery resources as a means of protecting these resources and to maintain a steady yield. Just before the Second World War, it was pointed out that a rate of fishing that produces maximum steady yield may not necessarily be the most economical one. The effects of regulation on the incomes of those whose livelihood depends on the exploitation of fishery resources, is of utmost importance. For example, on certain fishing grounds, cost factors may be too high for the economic exploitation of the fishery by a great number of fishermen. In such cases, it might be necessary to give consideration to alternate measures such as the exploitation of these grounds by only a limited number of fishermen, so that each could derive a greater income from the fishery.

The problem of determining and ensuring an economic level of fishing intensity are rather complex, since they require not only an evaluation of biological and economic factors but also agreement among nations as to the best exploitation of fish stocks that are often property common to all. Numerous agreements among countries interested in the protection and exploitation of certain fishery resources were now in force. The meeting is to provide an opportunity for discussion on experience gained in the Northwest Atlantic lobster and the Pacific Northeast halibut industries, the South African pilchard

industry, the whaling industry and the Japanese trawl fishery. Regulations have been closely examined from a theoretical and economic standpoint in a working paper. "The Economics of Regulating Fisheries," prepared by Mr. Anthony Scott of the University of British Columbia (Canada) for the meeting. "The criterion against which methods of regulations and their results are assessed is that of the efficiency of the whole economy, in which the fishery is just one industry," writes Mr. Scott. "It should be asked of each fishery regulation," he continues, "whether it assists or retards efforts to make the best joint use of manpower, capital and natural resources." Using this criterion, the meeting would examine and evaluate the economic effects of the different types of fishery regulation (e.g. closed areas, closed seasons and quotas, limitations on technology, gear and entry) as applied in selected fisheries. A special paper on the biological aspects has been prepared for the meeting by Dr. L.M. Dickie, Atlantic Biological Station, St. Andrews, New Brunswick, Canada.

FAO Forum on Research Vessels

How do creatures seven miles down in the ocean's depths generate light within their bodies? Why do fish migrate? Do they navigate celestially as birds do? Adult sea fish are caught, but their eggs are never found. Where are they laid? Questions like these are beginning to be answered by research vessels exploring the sea, which contains regions less known than the moon's surface. Some 200 Japanese research vessels range thousands of miles from their native land, testing currents, temperatures, the concentration of plankton gathering indicators of where the fish are.

Waiting for this information is the far flung Japanese fishing fleet. The fishery research vessel, which not only collects hydrographic information, but tests new fishing methods and gear, will be the major subject at a FAO sponsored Forum on Research Vessels, 18-30 September 1961 in Tokyo, Japan. The purpose of the meeting is to compile and exchange information on the design and operation of research vessels, particularly those for fishery research. It will also give oceanographers, biologists and naval architects a chance to discuss mutual problems and accomplishments. The necessity for fishery research can be illustrated by the fact that 30 million tons of fish are taken from the sea each year. This amount has increased by about one half in the last 10 years. With a growing world population, the sea will have to increase its harvest. But for this increase we must know the best method of protecting and utilizing her resources. Only a few kinds of fish of the large number of known varieties are caught. Many parts of the ocean, especially in the southern hemisphere, are scarcely fished at all. Fisheries research vessels, no matter who designs them, all have one thing in common. They are expensive. For the ships must be floating laboratories. A small research vessel of about 500 tons will cost around 1.65 million dollars. This is expensive, but any ship of 500 tons is expensive. The reason for the high cost, is all the instruments and facilities that a research vessel must carry. The U.S.A. is planning to build 70 research vessels costing 210 million dollars during the next 10 years. There is a need for vessels to do just basic research. The maximum economic yield of many fisheries needs to be determined. Prior to World War II, Japan was one of

the few countries greatly involved in such research. Japan now depends on fish as their principal source of animal protein and the Japanese not only eat hundreds of varieties of fish, but many kinds of seaweeds. Comparing fisheries with agriculture, fisheries is behind. For instance, the yield of the sea possibly could be increased by 'ploughing' the ocean bottom as one would till the soil. This would bring dissolved substances from the depth to the surface and provide more food for fish. Fishery research vessels have already paid off in immediate results. A German vessel, the *Anton Dohrn*, has found several new fishing grounds. One bank located near Greenland and yielding red fish, has been named the Dohrn Bank. A Norwegian fisheries research vessel spotted the herring before they reached the Norwegian fjords. This enabled the herring season to be extended and the increased revenue from the larger catch paid for the boat. FAO's Fishing Boat Section had advised a number of its member governments, including the United States and Iceland, on the designs of their fishery research vessels. The Section designed three such vessels for the Union of South Africa. Another of its jobs was saving the Swedish government about \$160,000 on refitting its fishery research vessel, the *SKAGERAK*. The Section recommended engines and winches that cut the refitting cost; the resulting saving more than equalled the Swedish contribution to FAO that year. The Research Vessel Forum will not be just limited to fishery research ships. The Forum will also examine hydrographic survey ships, polar exploration

vessels, hospital ships, lighthouse tenders cable ships and non-magnetic ships.

Regional Fisheries Body for West Africa

A regional fisheries body to serve member countries of the FAO in West Africa as other FAO fisheries bodies do in the Mediterranean and in the Indo-Pacific regions, was the subject of invitations issued by the Director-General of FAO. The invitation, sent to all FAO member and associate governments in an area bounded by the Straits of Gibraltar and the Cape of Good Hope, including the regions which drain into the Atlantic Ocean and Lake Chad, was to convene a meeting 15-20 May in the Republic of Senegal to explore the possibility of establishing a fisheries consultative body in the Western African region. The Director-General was requested at the 10th session of the FAO Conference in November 1959 to explore establishing such a commission. The proposal was endorsed by the U.N. Economic Commission for Africa (UNECA) in February 1960 and by the first FAO Regional Conference for Africa at Lagos in November 1960. The main purpose of the meeting was to seek advice from delegates as to the scope of activity and terms of reference for such a consultative body and the area which it will serve. It will also consider the Commission's relationship with other international bodies concerned with fisheries in the West African area. The delegates will be asked to give a brief statement concerning the general problems facing fishery development in their countries, where the solutions might be

facilitated by international action by a fisheries consultative body under the aegis of FAO.

South Pacific Commission

In its Proceedings of the 21st Session held in Noumea 25 October 1960, the Commission drew attention to the research in progress on the causes of toxicity (ichthyosarcotoxism) in fish. It accepted the recommendations of the Research Council that the Commission should use its efforts to stimulate research leading to further knowledge of the causes of this phenomenon and suggesting that the Commission might draw up and distribute a list of those fish species which do not cause such poisoning. The Commission decided to continue to collect all available information on this subject and in due course to publish it in the South Pacific Bulletin. The Commission also directed the Secretary-General to determine how the Commission might facilitate research into this problem and to investigate sources of outside help which might be available. The Proceedings also noted the continued interest shown by territories in the area in the activities of the Commission's Fisheries Service and anticipated completing the fisheries survey in 1961. Following the completion of this survey the Commission decided that a Technical Meeting should be held early in 1962 to review the project and to advise on a future program. In expressing thanks to the United Nations and the Government of British Solomon Islands Protectorate, the Commission recorded with pleasure the successful organization and opening of the

Boat Building Course at Auki, Malaita and approved in principle the setting up of a second sub-regional course in Noumea. The Commission further approved the program for a Sub-Regional Fisheries Training Center in fishing methods, fish preservation, care of nets and the use of small powered vessels. This center, to be conducted for two months during 1961 at Tulagi in the British Solomon Islands Protectorate would be developed with the assistance of FAO which had arranged provision in the 1961 budget of the Regional Technical Assistance Program.

Fish in Nutrition

The role of fish in world nutrition—the present abundance of fish and future potential supply—will be discussed at an international conference on Fish in Nutrition, to be held from 19–27 September in Washington, D.C. Sponsored by the FAO the conference will deal with the world production and utilization of fish not only for human nutrition but also in animal feeding. The U.S. Fish and Wildlife Service is handling the conference on behalf of the U.S. Government. Participants representing some 50 nations of FAO's 82-nation membership are expected to attend, along with scientists invited from governmental and non-governmental organizations and members of the fishing industry. "The conference is unique in that it will be the first time that scientists in the fields of nutrition, fisheries and animal health have been gathered together with experts in fish processing to consider what is really known of the place of fish and fishery products in human and animal nutrition," said Dr. Eirik Heen, chief of FAO's

fisheries technology branch and general secretary of the meeting. The conference will provide an opportunity, said Dr. Heen, to compile and make available internationally the current knowledge on the nutritive value of fish and fishery products and on the biological factors affecting their nutritional value. Discussion at the conference on nutritional, biochemical and clinical research now underway on fishery products and components should provide a guide for future scientific investigation to fill in the gaps in research knowledge. A grant given by the U.S. National Institute of Health through the U.S. National Academy of Science will provide

for a limited number of travel fellowships to enable internationally-known scientists to participate in the conference. These grants, said Dr. Heen, are also partly designed for the active scientist in developing countries, who can utilize knowledge gained at the conference upon his return. The agenda calls for papers to be presented on such topics as the importance of fish protein in combatting protein malnutrition, as found in weaned infants as a result of diet and poor nutritional practices; the possible role of fish fats and oils in connection with cardiovascular diseases; the effect of processing on the nutritive value of fish products.

FORTHCOMING MEETINGS AND TRAINING CENTERS, 1961

Date	Subject of the Conference	Convening Body and/or Organizers	Location
MEETINGS			
July	SPC Research Council	South Pacific Commission	Noumea, New Caledonia
21 Aug.-6 Sept.	Pacific Science Congress (10th Session)	Pacific Science Association	Honolulu
September	ECAFE Inland Waterways Sub-Committee 6th Session	ECAFE	Bangkok
18 Sept.-30 Sept.	Research Vessel Forum	Jan-Olof Traung, FAO	Tokyo
19 Sept.-27 Sept.	International Conference on Fish Nutrition	Eirik Heen, FAO	Washington, D.C.
14 Oct.-20 Oct.	South Pacific Commission (Twenty Second Session)	SPC	Noumea, New Caledonia
23 Oct.-30 Oct.	Technical Meeting on the Control of Wholesomeness of Irradiated Foods	FAO/WHO/IAEA	Brussels ?
4 Nov.-24 Nov.	FAO Conference	FAO	Rome
6 Nov.-	International North Pacific Fisheries Commission	-	Tokyo
27 Nov.-8 Dec.	FAO/ECAFE Meeting on Food Consumption Surveys	FAO/ECAFE	Bangkok
5 Dec.-12 Dec.	5th Joint FAO/WHO Nutrition Conference for the Far East	FAO/WHO	Hyderabad, India
18 Dec.-21 Dec.	Consultants Meeting on Marine Bio-Geography	FAO	Rome

SEMINARS AND TRAINING CENTERS

9 Aug.-17 Oct.	Training Center on Fishing Methods and Mechanization for South Pacific Commission Countries and Territories	FAO/SPC	Tulagi, British Solomon Islands Protectorate
Sept. / Oct. (5 weeks)	Seminar and Study Tour for Fishery Administrators from the Indo-Pacific and Mediterranean Regions	FAO	USSR

SEMINARS AND TRAINING CENTERS

Date	Subject of the Conference	Conference Body and/or Organism	Location
July	FAO Fisheries Council	South Pacific Commission	Honolulu
11 Aug-6 Sept	Pacific Science Congress (10th Session)	Science Association	Honolulu
Sept	WCA's Indian Watersheds Sub-Committee 5th Session	WCAFE	Bangkok
15 Sept-30 Sept	Research Vessel Forum	Int. Counc. Transp. FAO	Tokyo
16 Sept-20 Sept	International Conference on Fish Nutrition	FAO	Washington, D.C.
19 Oct-20 Oct	South Pacific Commission (Twenty Second Session)	SPC	Honolulu
26 Oct-30 Oct	Technical Meeting on the Control of Invasiveness of Invertebrate Pests	FAO/WHO/FAO	Buenos Aires
1 Nov-21 Nov	FAO Conference	FAO	Rome
6 Nov	International North Pacific Fisheries Commission		Tokyo
27 Nov-5 Dec	PACIFIC FAO Meeting on Food Consumption Surveys	FAO/WHO/FAO	Bangkok
6 Dec-12 Dec	5th Joint FAO/WHO Nutrition Conference for the Far East	FAO/WHO	Hyderabad India
15 Dec-21 Dec	Transients Meeting on Marine Biology	FAO	Rome

SEMINARS AND TRAINING CENTERS

3 Aug-17 Oct	Training Center on Fishing Methods and Mechanization for South Pacific Commission Countries and Territories	FAO/SPC	Tutag, British Solomon Islands Protectorate
Sept (Oct (2 weeks)	Seminar and Study Tour for Fishery Administrators from the Indo-Pacific and Mediterranean Regions	FAO	USSR

IMPORTANT IPFC PUBLICATIONS

PROCEEDINGS (Records of Council Sessions.)

*First Meeting, Singapore, 24 - 31 March 1949

Section I: Report of Proceedings

Section II: Working Papers

Section III: Contributed Papers

Section IV: Symposium Papers

Second Meeting, Cronulla, N.S.W., Australia, 17 - 22 April 1950

Section I: Report of Proceedings

Section II: Technical Papers

Section III: Symposium Papers

Third Meeting, Madras, India, 1-16 February 1951

Section I: Report of Proceedings

*Section II: Technical Papers

*Section III: Symposium Papers

Fourth Meeting, Quezon, Philippines, 23 October - 7 November 1952

Section I: Report of Proceedings

*Section II: Technical Papers and Symposium Papers

Fifth Meeting, Bangkok, Thailand, 22 January - 5 February 1954

Section I: Report of Proceedings

*Section II: Technical Papers

Section III: Symposium Papers

Sixth Session, Tokyo, Japan, 30 September - 14 October 1955

Section I: Report of Proceedings

Section II: Technical Papers

Section III: Symposium Papers

Seventh Session, Bandung, Indonesia, 13 - 27 May 1957

Section I: Report of Proceedings

Section II: Technical Papers

Section III: Symposium Papers

Eighth Session, Colombo, Ceylon, 6 - 22 December 1958

Section I: Report of Proceedings

Section II: Technical Papers

Section III: Symposium Papers

Ninth Session, Karachi, Pakistan, 6 - 23 January 1961

Section I: Report of Proceedings (in Press)

Section II: Technical Papers (under preparation)

Section III: Symposium Papers (under preparation)

(* Items so marked are out of print.)

CURRENT AFFAIRS BULLETIN

No. 1-31 July 1951 - August 1961 (*1-21, 23)

SPECIAL PUBLICATIONS (Irregular)

- * No. 1: Schuster, W.H. (1952). Fish Culture in Blackish-water Ponds of Jawa. 1 - 143 pp.
- * No. 2: Anonymous, (1952). Fish Culture in Indonesia. 1 - 126 pp.
- No. 3: Zaneveld, J.S. (1955). Economic Marine Algae of Tropical South and East Asia and their Utilization. 1 - 55 pp.
- No. 4: Anonymous, (1958). Annotated Bibliography on Fishing Gear and Methods.

MISCELLANEOUS

Directory of Fisheries Institutions-Asia and the Far East.

1961 OCCASIONAL PAPERS

- No. 61/1 The Rastrelliger Fishery Research in Thailand, by S. Bandhukul.
- No. 61/2 A Preliminary Bibliography of the Freshwater Algae of the Indo-Malaysian Region, by G.A. Prowse
- No. 61/3 Some Aspects of Prawn Drying in Kerala, by S.N. Rao and A.G. Vasavan.
- No. 61/4 Economic Marine Algae of Ceylon, by M. Durairatnam.
- No. 61/5 A Review of the Salt Fish Industry of Kerala, by S.N. Rao and A.G. Vasavan.
- No. 61/6 An Observation on the Development of Tuna Like Fishes Trolling by Motorized Vessels, by M. Unar.
- No. 61/7 Plankton Studies in Manila Bay, by I.A. Ronquillo and E. Bernabe.
- No. 61/8 Status and Progress of Chanos Fishery in the Philippines, by H.R. Rabanal.
- No. 61/9 Present Status of Research and Development in connection with the Chanos Fisheries in Vietnam, by Le Van Dang.
- No. 61/10 Fisheries Statistics of Thailand, by S. Suwananonta.
- No. 61/11 A Preliminary List of Inshore Diatoms of the Southern Coast of Korea, by Kwan Yong Cho and Won Tack Yang.
- No. 61/12 Report of a Preliminary Survey of the Ajamroe Lakes, Netherlands New Guinea, by G.A. Reeskamp.
- No. 61/13 Research Activities on Marine and Freshwater Agriculture and Propagation, Central Fisheries Experimental Station, Pusan.

(* Items so marked are out of print.)